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THE IRON AGE

Contents

APRIL 27, 1939

Picket Line Etiquette	27
Some Observations on 18-4-1 Steel	29
Of Things to Come	35
Analysis of Residual Chromium in Steel	38
New Specifications for Metals	40
Steel Quality and Hot Working Properties	42
Design Changes in Motors and Lighting Equipment	46
We Build America	52
Machine Tool Electrification Forum	54
On the Assembly Line	55
Washington News	60
THE NEWS IN BRIEF	72
Pig Iron and Ferroalloy Output in 1938	84
Weekly Ingot Operating Rate	85
Rate of Activity in Capital Goods	85
Plant Expansion and Equipment Buying	100
* * * * *	
Just Between Us Two	115
Products Advertised	116
Index to Advertisers	138

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... THE IRON AGE ...

APRIL 27, 1939

ESTABLISHED 1855

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Picket Line Etiquette

WHAT is the general public to do about picket lines? Are the people who have no direct interest in one side or the other of a labor controversy supposed to accept the notion that a picket line, however and wherever established, immediately becomes hallowed ground and must not be crossed?

If I were a dues paying member of a union that had pulled a strike, I would not cross its picket line as a matter of principle. If I were a non-union member of an "open shop" faced with similar circumstances, I might not cross it because of dislike of a broken head. And if I were a politician whose support came from a union district, I would probably refrain from crossing it for fear of losing my job.

We can understand the self-interest which would prevent such people from violating these higher laws. Not the laws of our country, nor the laws of God in terms of any religion. The sacred law of the picket line!

It is strange how seriously great public figures take such things. Much more so than even the brass hat labor boys like Bill and John. If John's cook declared that the Lewis mansion was unfair to organized cookery, do you think John would move his family into a hotel? Or if Bill was faced with a headquarters elevator strike pulled by a CIO building service union, do you think that he would shut up the office?

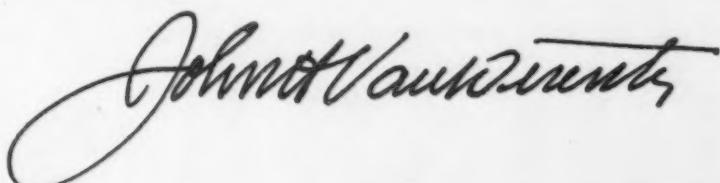
Speaking of building service strikes, the Washington boys say it was funny to watch the antics of some of our statesmen recently during the hotel strike. How they wracked their brains for a way to sneak in through the cellar door for the clean shirt or suit that they needed so badly—without getting caught at crossing a picket line! And the newspapers even carried an item, during that strike, that things had been arranged so that the President would not have to cross a picket line in attending an important function!

And only last week, the action of the First Lady in apologizing for having inadvertently "crossed a picket line" by taking an Eastern Airlines plane from Washington to Newark, while some service mechanics were on strike!

Why shouldn't the President cross a picket line? Would it be a violation of his oath to equitably serve and administer the law for all Americans, regardless of party, rich or poor, union or non-union, worker or employer?

Is it not rather a most unjust action to imply by high example that whenever an employer is faced by a picket line he should immediately be adjudged guilty by the general public and his business boycotted?

And what would happen if the public should follow this example and adopt this course of action? We would have a new ruler of the United States—the picket line!





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Some Observations on-

18-4-1 HIGH SPEED STEEL

By J. G. MORRISON

*Metallurgist, Landis Machine Co.,
Waynesboro, Pa.*

OF primary concern to the manufacturer of high speed tools is the quality of the steel used as regards both the chemical and the physical uniformity, from heat to heat. Individual consumer specifications usually are based on recorded experience, following which the limits specified are arbitrarily fixed.

The present article is a brief description of some rather pertinent recordings of one manufacturer's experience with 18 per cent tungsten, 4 per cent chromium and 1 per cent vanadium high speed steel. This type of high speed steel is the one most generally used throughout industry and, although higher alloyed steels and a variety of molybdenum steels are finding some application, they have yet to find universal favor. One of the reasons for this is probably due to the backlog of some 25 years that the steel manufacturer and consumer have had in the way of experience with 18-4-1 high speed steel. Today, because of this wealth of experience, 18-4-1 high speed steel may rightly be called a predictable product. With a reasonable degree of certainty, it is known how the steel should behave and how it will perform when made into tools.

THIS is the first section of a two-part article. Described first is an identifying system enabling every steel to be traced through all manufacturing steps. The effect of trace elements is also described, and detailed attention is paid to the causes of sweating, that is both premature and abnormal sweating.

New steels such as the molybdenum steels bring with them different properties, some of which may be so subtle as to escape notice for some time. The new high speed steels which have been developed and those now in process of development have a tough protagonist to face in the hardy 18-4-1 veteran of the high speed steel field. The present molybdenum steels have captured some applications where 18-4-1 steel was formerly used, but the former do not as yet seriously threaten the supremacy of 18-4-1.

However, there is such a vast field to be explored as regards varied com-

positions containing molybdenum, that in the not too distant future the industry may see a really stern competitor of 18-4-1 high speed steel.

About 12 years ago the company with which the writer is associated established a system for marking the high speed steel which it uses in the manufacture of threading tools, such as those shown in Fig. 1. The purpose of this method of stamping each piece of steel was to permit identification of any tool made of 18-4-1 high speed steel at any point in the process of manufacture, as regards the purchase order, vendor and heat number from which that particular piece of steel was made. Because of conditions natural to the company's manufacturing process, this method of stamping each individual piece of high speed steel has proved of distinct benefit. However, it's possible that the system might not find general application or approval. A brief description of this system of stamping is given in the following paragraphs, more as an introduction to some of the data regarding the characteristics of various heats of high speed steel assembled by means of the system.

High speed steel intended for tools to cut threads such as those shown in

Fig. 2 is specified to the steel manufacturer to be furnished, whenever possible, from one heat of steel for each purchase order size. When more than one heat of steel is used on a single size, the bars of each heat are to be properly marked for identification as regards respective heat numbers. The use of more than one heat of steel for filling a purchase order size rarely occurs. One reason for this is that complete heats of high speed steel are not contracted for. In fact, experience has shown that contracting for complete heats of high speed is neither necessary nor desirable. Steel is purchased for us—not rejection—and where rejection is necessary it causes less inconvenience to reject 1000 lb. of one size than 6000 lb. of six sizes, as might be the case if a heat should contain an abnormal amount of some offending element.

The receipt of each purchase order size of high speed steel is accompanied by a card or invoice from the manufacturer giving the heat number and the so-called complete analysis of the steel. The material is inspected for size and shape and sampled by the laboratory for analysis, decarburization, "carburization," hardenability, etc. If the material is found to be acceptable an identifying symbol is then assigned to the heat of steel from which this size was made. If the same heat of steel is used to fill future purchase orders, the same symbol is applied.

As orders are received by the stock room to furnish so many blank pieces of a certain size and carbon range, the bars are cut to proper lengths and the heat symbol stamped on one end of each blank piece by means of steel stamps. The type of tool manufactured permits of stamping the heat symbol in a location such that it will not be molested at any time during the process of manufacture. Thus, the finished tool will bear the same symbol as first placed on the blank cut from the bar. Thus, "Great Scott Steel Co.'s" heat No. H002J has become "XX", and no matter where a piece of this steel may travel it will not only bear this stamp of initial approval but also will still be subject to the scrutiny of the machining, heat treating and inspection departments, and again by the laboratory should anything unusual be observed during manufacture.

There are five duplicate books listing the heat symbols and pertinent data, and one of these is located in the assistant superintendent's office where authority emanates for starting the steel on its way; one in the steel

stock room, one in the heat treating department, one in the inspection department, and one in the laboratory.

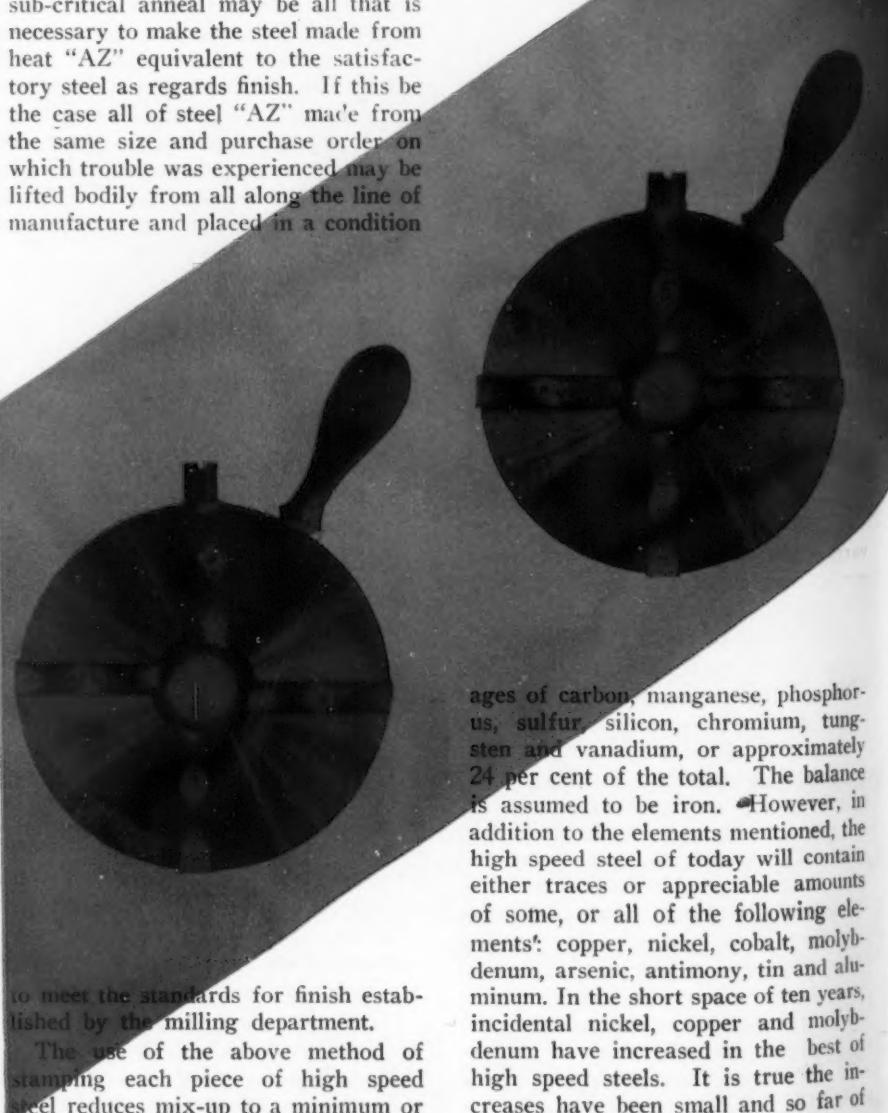
The use of this simple method of stamping and the availability of steel data have made, one might say, the entire manufacturing line "heat conscious." For example, the machining department may experience trouble in obtaining a desirable milled finished surface on a certain lot of tools. Before the laboratory is apprised of this the milling department will have discovered the same thing by alternating pieces of steel of an already known satisfactorily machining heat "AC" and pieces of the suspicious heat "AZ" in the same jig load. They may confirm their suspicion that steel made from heat "AZ" does not produce a milled surface that is up to their standard for finish. In this case the laboratory learns quite emphatically that steel "AZ" does not meet their requirements for machineability. The problem as given to the laboratory is therefore a concrete one. A sub-critical anneal may be all that is necessary to make the steel made from heat "AZ" equivalent to the satisfactory steel as regards finish. If this be the case all of steel "AZ" made from the same size and purchase order on which trouble was experienced may be lifted bodily from all along the line of manufacture and placed in a condition

exposes them just as quickly as they occur.

During the period that the present system of marking the high speed steel has been in use there has been processed and now in process a volume of material representing 702 heats of 18-4-1 high speed steel. This does not mean that 702 complete heats of steel were processed, for in some cases as little as 300 lb. only of one heat was consumed. There were, however, a sufficient number of tools made from each heat of steel to permit adequate daily observation, the aggregate giving a somewhat comprehensive view of this type of steel as applied to threading tools.

Trace Elements Watched

The most fundamental consideration of quality in high speed steel, as with other steels, is the chemical analysis. The usual complete analysis of 18-4-1 high speed steel embraces the percent-



to meet the standards for finish established by the milling department.

The use of the above method of stamping each piece of high speed steel reduces mix-up to a minimum or

ages of carbon, manganese, phosphorus, sulfur, silicon, chromium, tungsten and vanadium, or approximately 24 per cent of the total. The balance is assumed to be iron. However, in addition to the elements mentioned, the high speed steel of today will contain either traces or appreciable amounts of some, or all of the following elements: copper, nickel, cobalt, molybdenum, arsenic, antimony, tin and aluminum. In the short space of ten years, incidental nickel, copper and molybdenum have increased in the best of high speed steels. It is true the increases have been small and so far of

little consequence as regards affecting the properties of this steel as they are understood. These incidental impurities, however, have tended and do tend to increase—and with such increases are the attendant hazards of an abnormal amount of one or more harmful elements finding a way into a heat of steel which a customer may receive.

dental impurity, or the combined limit of complimentary impurities, should be held is perhaps variable, and to a

below 99.5 per cent to, say, 98.5 or 99.25 per cent. No doubt, further investigation of such heats would disclose the presence of an abnormal amount of one or more incidental impurities. Heats listed herein in Table I, and designated as "Y" and "Z," are examples of two heats of steel which the manufacturer might have recognized had there been established a statistical standard by means of an additional chemical determination, viz., that of iron.

The percentages mentioned are merely arbitrarily selected for the purpose of example and therefore have no significance as to fact.

Heat characteristics, heat personality or inherent heat characteristics are terms used more or less synonymously. They imply that two heats of any one type of steel may show an almost identical usual chemical analysis, yet one heat may show properties differing radically from the other. In the case of two heats of carbon tool steel which show an almost identical usual chemical analysis, one may be deep hardening and one shallow hardening. In the case of two heats of carburizing steel showing an almost identical usual chemical analysis, one may be fine grained and one coarse grained.

The work of McQuaid and Ehn has given the industry a rationalized system for grading carburizing and other steels; and Shepherd has made available a rationalized system for grading the carbon tool steels. The McQuaid-Ehn test for low carbon steels and the Shepherd P-F¹ test for carbon tool steels have proved invaluable to both the manufacturer and consumer of these and related steels.

Heat personality is to be found in 18-4-1 steel just as surely as it is found in case carburizing steels, medium carbon steels and carbon tool steels. However, it is highly improbable that the industry may expect to see developed a system for grading 18-4-1 steel having the same simplicity and direct usefulness as characterize the McQuaid-Ehn and Shepherd tests. The heat characteristics of 18-4-1 high speed steels are perhaps of a more subtle nature than those possessed by carbon tool steel or the case carburizing steels. All test methods involve the use of samples which are subjected to temperatures approximating actual heat treating temperatures. In the case of high speed steels, one of the temperatures that might be selected for an arbitrary test procedure would be 2350 deg. F.

In the McQuaid-Ehn test, one hour

FIG. 1—Illustrating the four main types of threading dies (or chasers)—hobbed, milled, circular and tangent type dies—and the relative positioning of a set (in this case four chasers) in a threading fixture or head.

• • •

Most manufacturers periodically make a complete analysis of a certain heat of high speed steel. Some analyze every fifth heat for nickel, cobalt and molybdenum; others make even more frequent checks on these elements.

From the standpoint of producing a high speed steel that insures a duplicate degree of machineability, response to heat treatment and a reasonable constancy as regards cutting performance, it is very probable that an entire freedom from nickel, molybdenum, cobalt, etc., may even be undesirable. This follows from the fact that high speed steel made to a high degree of chemical purity by using only muck bar and ferroalloys often is of inferior quality as regards response to heat treatment and cutting efficiency. To just what limit each inci-

¹ See "P. F. Characteristics of Steel," by B. F. Shepherd, THE IRON AGE, Oct. 22, 1936.—Ed.

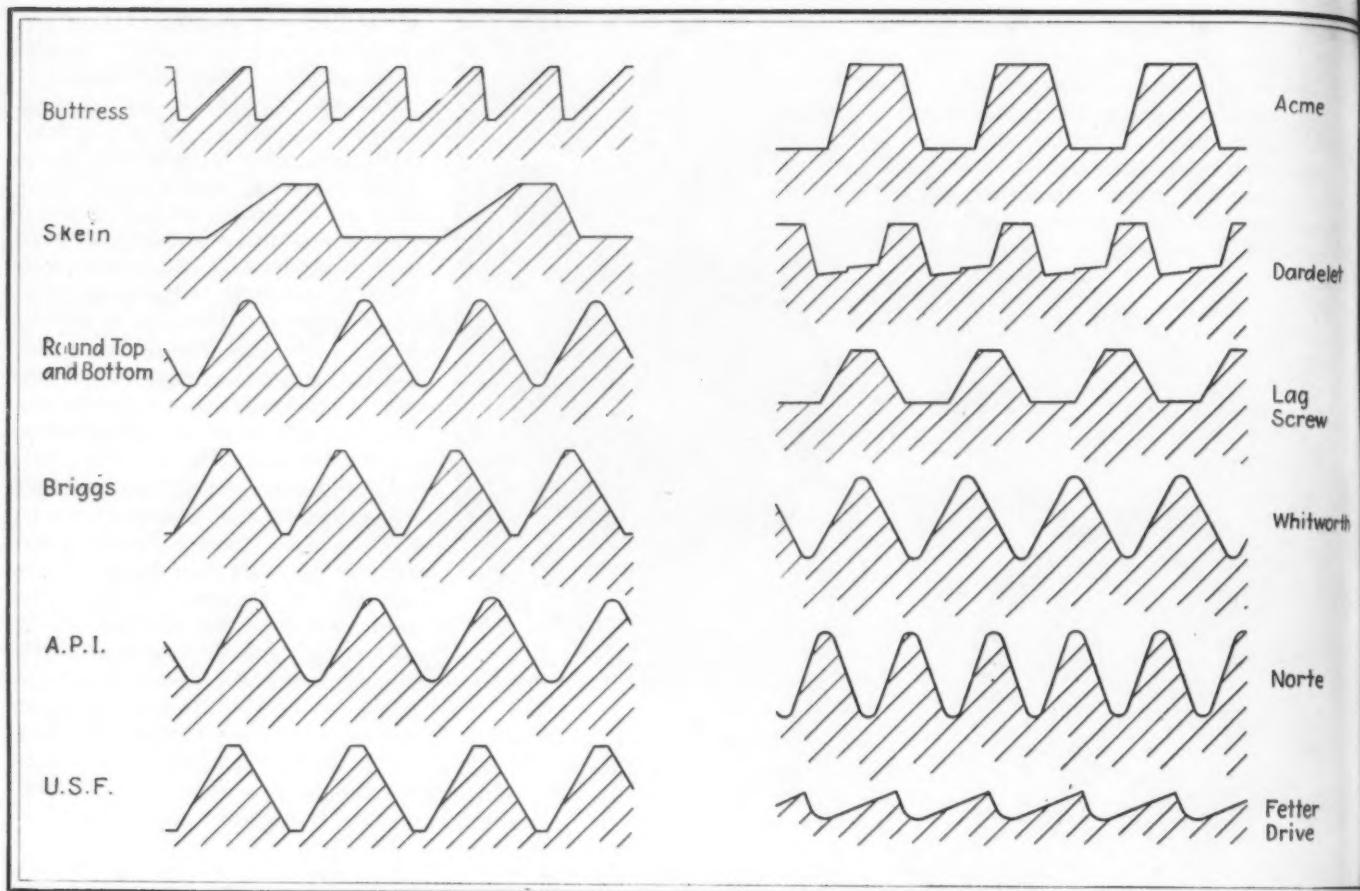


considerable extent it is a consumer problem.

Molybdenum and cobalt are probably within certain ranges additive regarding the tendency of the steel to decarburize during heat treatment. Arsenic and phosphorus are probably additive toward rendering high speed steel susceptible to cold shortness. Nickel may be additive with either molybdenum or cobalt or both as regards susceptibility to decarburization during heat treatment.

The most fundamental element of high speed steel, as with any steel, is iron—the one least analyzed for. A determination of the percentage of iron in high speed steel is something of a rarity.

The writer is not fully conversant with the problems facing the steel manufacturer as regards raw materials, or the statistics on off-composition heats, but it would appear that if the manufacturer of 18-4-1 high speed steel, instead of assuming the balance of the usual chemical analysis to be iron, were to actually run an iron determination on each heat it would, in time, prove a valuable index of the chemical quality of this type of steel. Let it be assumed that a manufacturer were to make an iron determination on each heat of high speed steel. Considering plus and minus accuracies of all elements determined and the presence of incidental impurities not analyzed, let it be supposed that the manufacturer in time should find that satisfactory material showed the percentage total of elements to fall between 99.5 and 99.9 per cent. Then, let it be supposed that the total percentage of elements of a heat fell



more or less of carburization at 1700 deg. F., or half an hour additional time at 1450 deg. F., or at the higher temperatures which may be used in the Shepherd test, do not profoundly alter the test results. In the case of 18-4-1 steel, two minutes, more or less, at 2350 deg. F. would cause a very profound change in the test results on samples of such size as could be conveniently handled for testing.

The results of the McQuaid-Ehn and Shepherd tests may be translated quite directly into shop practice. To translate tests that might be run on 18-4-1 steel into an almost universal shop comprehension does not appear probable. For a simple example, tool manufacturer "X" may produce a high speed steel tool that for all around good performance should be overheated either slightly or considerably during heating for hardening. Tool manufacturer "Y" may produce a tool where overheating, even slightly, produces a tool that is too brittle. Tool manufacturer "Y" requires a steel showing a good response to heat treatment, one that is, for instance, not sluggish to heat treatment. Since tool manufacturer "X" uses a higher hardening temperature or a much longer

period at temperature, a steel that may act sluggishly, and therefore not meet "Y's" requirements, might prove satisfactory to "X."

Perhaps no steel ever made has quite the versatility of 18-4-1 high speed steel as regards the various methods of heat treatment which it may receive. Today, this steel is being pack-hardened (or carburized), heated for hardening over a range from 2000 deg. to 2400 deg. F., quenched for hardening in either air, air blast, water cooled plates, molten salt baths, oil, or a combination of salt bath and oil. The steel may be used, and quite satisfactorily, for some applications without tempering, or it may be tempered anywhere from the boiling point of water to 1200 deg. F. After tempering it may be given a nitriding treatment in aged mixtures of sodium and potassium cyanides at anywhere from 900 deg. to 1150 deg. F., in order to develop a surface hardness vastly harder than the steel itself is capable of being made; or, the tempering and nitriding may be accomplished simultaneously in the nitriding bath. To develop a test for indicating the quality of 18-4-1 steel which would approach the adequacy of the McQuaid-

Ehn and Shepherd tests in their respective fields would appear a difficult undertaking with a steel which may mean so many different things to so many different people.

Two heats of steel of almost identical usual analysis, but which show different characteristics, are different because of differences in amounts or distribution of unusual elements not ordinarily analyzed for. These differences in heat characteristics have been attributed to the presence of different amounts of aluminum, aluminum oxide, other oxides, or dissolved gasses.

The chemistry involved in these differences is not thoroughly understood because of the minute quantities which appear to have such potent effects, and also because of the difficulties involved in readily obtaining accurate determinations of these minute quantities.

Heat Characteristics of 18-4-1

Heat' characteristics, heat personality, or inherent heat characteristics require qualified definition. Inherent is perhaps an unfortunate word as it implies permanency. This is not always true of the so-called heat characteristics. With all the excellent

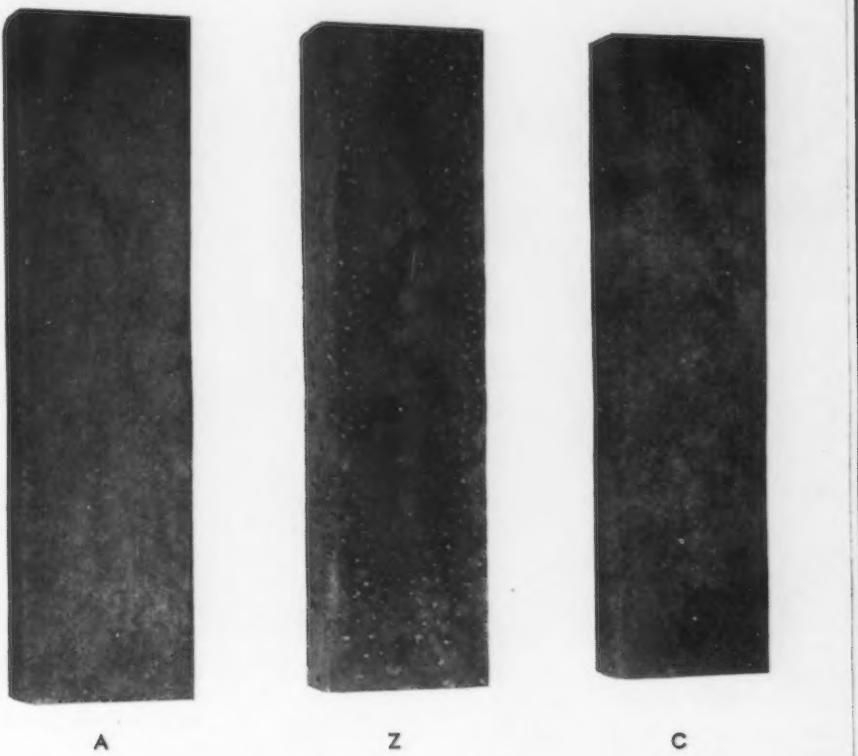
AT LEFT

FIG. 2—Sketches of a number of thread forms for which chasers may be made, in a variety of pitches, for cutting threads in any type of machineable material.

• • •

AT RIGHT

FIG. 3—These photographs illustrate the abnormal tendency of steel of high speed heat "Z" to sweat during heating for hardening, as compared with samples "A" and "C" made from normal heats of steel. Samples treated at the same time on the same day in the same relative position as shown here.



control and the high percentage of "hits" achieved in making fine, coarse or intermediate grain size steels, a "sport" heat sometimes results. By all the known rules a heat that should be fine grained is coarse grained, or vice versa. Again by the use of certain prior treatments, so-called heat characteristics may be so altered as to again imply that the same heat of steel has two sets of characteristics. The same condition prevails in the case of 18-4-1 high-speed steel—a certain apparent heat characteristics may be so altered by heat treatment as to be entirely suppressed or eliminated.

The following list shows some of the probable or apparent heat characteristics of 18-4-1 high speed steel:

- (A) Susceptibility to premature "sweating," or more than ordinary resistance to "sweating" during heating for hardening at 2350 deg. F.
- (B) Some heats of steel exhibit the property of cold shortness.
- (C) Hardenability—some heats of steel may show a consistently lower hardness than average, or higher than average hardness, when given the same time—temperature, heating and tempering cycles under the same con-

ditions of furnaces and furnace atmospheres. Such a steel might be termed sluggish in its response to heat treatment, or active in response to heat treatment.

(D) Some heats of 18-4-1 steel may be more susceptible to decarburization during hardening.

(E) Some heats of 18-4-1 steel may be more susceptible to absorbing surface carbon during heating for hardening.

This list is not complete as regards probable heat characteristics of 18-4-1, although it perhaps shows those items of greatest concern to the manufacture of high speed steel tools. Considerable attention will be given to each characteristic in the list in the order named.

(A) SUSCEPTIBILITY TO SWEATING: Steel representative of three different heats of 18-4-1 high speed steel from three widely scattered sources were observed to have the characteristic of "sweating" both prematurely and abnormally in heating for hardening. All 18-4-1 high speed steels, if left in the furnace long enough, show this tendency to sweat in an atmosphere containing less than 14 per cent CO during heating for hardening at 2350 deg.

F. The tendency of a high speed steel surface containing a normal carbon percentage, say 0.70 per cent carbon, to sweat is greater in the relatively lean atmosphere of an oil-fired furnace, which contains at best about 1.75 per cent CO, as compared with the atmospheres ordinarily used in the controlled-atmosphere furnaces. A decarburized but scale-free surface, in general, appears to show a greater tendency to sweat in a controlled-atmosphere furnace where the atmosphere may contain 8 to 10 per cent CO than in the atmosphere of an oil-fired furnace. This tendency to sweat refers to the heating in the high-temperature furnace at 2350 deg. F., which temperature is perhaps the one most generally employed for the hardening of 18-4-1 high speed steel. The decarburized but scale-free surfaces of some 18-4-1 steels show by contrast a more than ordinary resistance to sweating, so that a decarburized surface is not itself a criterion that such a surface will be more susceptible to sweating in the 2350 deg. F. furnace.

Table I lists fairly complete analyses of three heats of high speed steel which possessed this tendency to sweat prematurely and abnormally. These

analyses are averages of checks made by two or more competent laboratories.

Heat Z, in Table I, exhibited the tendency to sweat abnormally to the greatest degree. Heats X and Z showed some tendency to decarburize during heat treatment, although as file tested there was no apparent decarburization. Heat Y showed an abnormal tendency to decarburize. The abnormal tendency to sweat and the tendency to decarburize appeared to be the same irrespective of the type of furnace used, whether the samples were preheated or not. Also, various types of furnace atmospheres which were tried had no noticeable effect.

A number of observations were made on samples cut from material from heat Z as follows: Samples of material from heat Z and samples of material from two normal heats of steel were cut to 4-in. lengths from bars 13/32 x 1 1/16 in. All bars were checked on the two broad sides for decarburization. This was found to be under 0.020 in. for all bars; 0.040 in. was removed from four sides comparable to what were the outer sides of the bar. Samples were then placed on a light heat resisting fork shaped rod tray in exactly the same relative position shown in the photograph of Fig. 3. The three samples were then treated in controlled-atmosphere furnaces as follows: Pre-heat at 1550 deg. F. for 16 min. in an atmosphere of 3 per cent CO; high heat at 2350 deg. F. for 2 min. 45 sec. in an atmosphere of 9.5 per cent CO and 7 per cent CO₂; then a quench in oil.

It was observed that the sample made from heat Z after transfer to the high-temperature furnace showed an abnormally sweated surface after it had been in the furnace for only 35 sec. The samples selected from the two normal heats of steel, one spaced in front and the other in back of the sample from heat Z, showed the normal freedom from any tendency to sweat at this time. Thirty-five seconds time would indicate that the samples had not yet reached a temperature of 2100 deg. F.

After quenching in oil and cooling to room temperature, the samples were

washed in benzol to remove adherent oil and then photographed. Note the great number of sweat beads (Fig. 3) on the middle sample made from heat Z. On other tests similar samples from heat Z and normal heats were given the same heating cycle, but quenched in air. The air quench shows a still greater disparity of surface condition between heat Z and normal heats. On an air quench, the steel may be observed from the time it leaves the furnace until it reaches room temperature, and the larger sweat beads, which are apt to be freed from the surface on oil quenching may be better observed. For certain test purposes an air quench on samples of high speed steel, provided the section is under about 3/4 in., permits of often obtaining some pertinent data. An oil quench often frees the surface of some things that are better to be observed on an air quench. An air quench is, of course, not advisable for steels such as the cobalt and molybdenum types as now made.

The under surface of test samples Z as placed in the furnaces for hardening show little tendency to sweat except for about 1 in. from each end—all the other five surfaces showed an abnormal amount of sweat beads. This difference of the under side of the sample as regards sweating is probably due to the atmosphere under the sample (in the region between the supporting rods of the tray) being in a more quiescent state. This probably results in a delayed surface reaction. If a gas, or gases within the steel, were the cause of this abnormal surface sweating, their evacuation from this area might proceed without the pronounced sweating observed on the other surfaces.

Causes for Sweating

Further investigation of material from heat Z was made in an effort to learn something of this peculiar condition. From the same bars of heat Z, samples 4 in. long were cut and then packed in cast-iron chips in a pipe sealed at both ends. The pipe was then heated to 2000 deg. F. and held at this temperature for 1 1/2 hr. The pipe containing the samples was

then cooled in silocel. Samples then were given a sub-critical anneal at 1450 deg. F., and 0.040 in. was milled from all four outer surfaces. On other samples taken from the same bar, 0.080 in. was removed from all four outer sides. Samples were then given the same heating cycle under the same furnace atmosphere conditions as above, viz., 1550 deg. F. for 16 min., 2350 deg. F. for 2 min. 45 sec., and then quenched in oil. The samples previously given the high temperature "anneal" at 2000 deg. F. showed only slightly more sweat marks than a normal heat would show, and the samples from which 0.080 in. was removed showed somewhat more sweat marks than those samples annealed at 2000 deg. F. Both cases, however, showed no tendency to sweat in the furnace as did those samples made from the bar from which only 0.040 was removed. The amount of sweating obtained on the "annealed" (2000 deg. F.) samples and those from which an excessive amount of metal (0.080 in.) was removed would be considered acceptable as it is not unusual for some heats to show this degree of sweating.

The three heats of steel which possessed this characteristic of sweating prematurely, and abnormally, in heating for hardening show abnormalities of analysis. Heat X contains a silicon content higher than that usually found in practice, although many a good heat of high speed steel has been made with silicon as high as 0.50 per cent. The other two heats show in the case of Y excessive nickel and copper, and of Z excessive amounts of molybdenum, cobalt and aluminum.

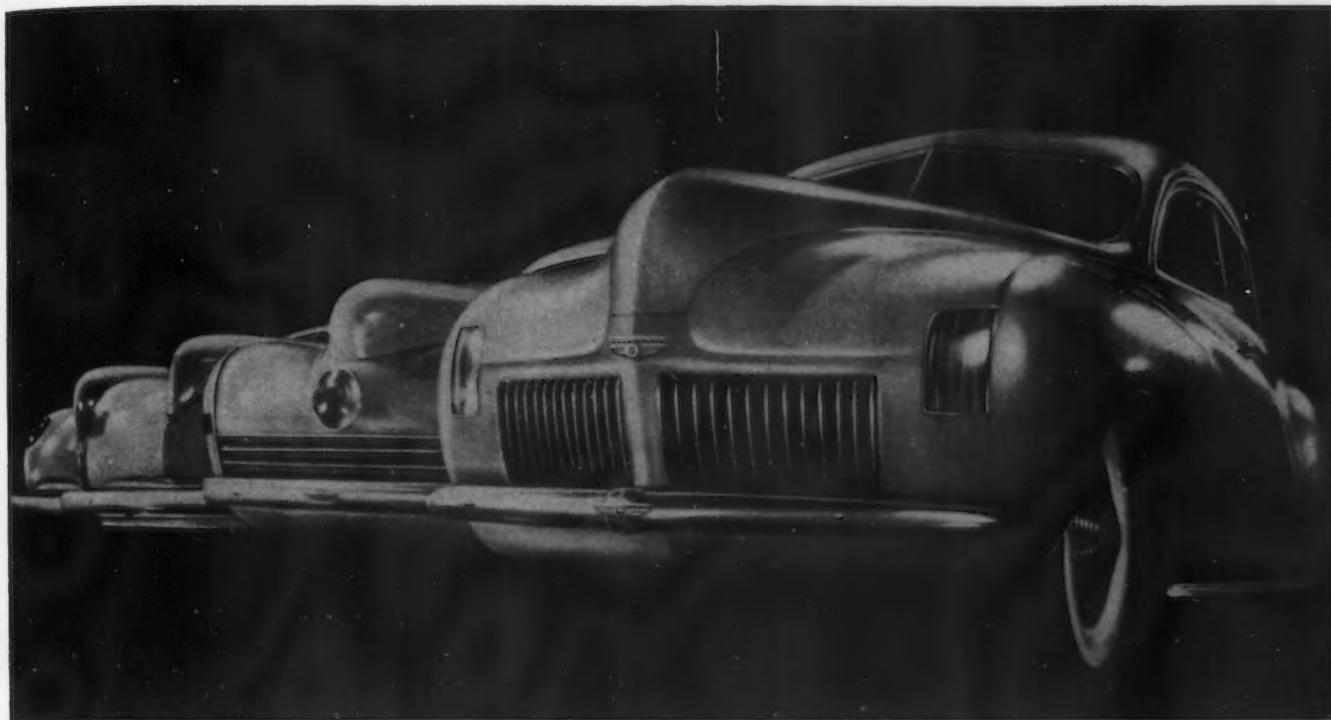
Any steel maker looking at the analyses of heats Y and Z might naturally say that he would not call them 18-4-1 high speed steel because of the excessive amounts of incidental impurities. They are, however, examples of steel which were marketed as 18-4-1 high speed steel.

Heat Z also exhibited the characteristic of possessing a low hardenability rating. This will be discussed in the second section of this article under the heading of hardenability.

(CONTINUED ON PAGE 104)

TABLE I
Three Analyses of High Speed Steel Which Sweat Abnormally

	C	Mn	P	S	Si	Cr	W	V	Mo	Cu	As	Co	Al	Ni
Heat X	0.68	0.31	0.017	0.023	0.49	4.03	18.56	0.95	0.08	0.075	0.029	...	...	0.039
Heat Y	0.70	0.26	0.017	trace	0.26	3.88	17.88	1.09	...	0.20	...	...	...	0.81
Heat Z	0.69	0.25	0.020	0.019	0.30	4.05	18.56	1.01	0.31	0.10	0.022	0.54	0.052	0.09



MANY suggested designs for new cars have been made up in modeled form for executives of automobile companies in recent years. Highly streamlined cars predominate. Generally, the most appealing features of each design are noted and combined in a new wooden model, which forms the basis for building up a final sample from which the draftsmen work.

Of things to Come

THIS is the season of the automotive year when final choices have been made by engineers and executives to settle the designs which will be built next year. When their stamp of approval has been set on such new designs, engineering release is given to the drawings and the tool and die shops are given the signal to go ahead.

The industry has just completed this phase of its annual cycle. Only rarely is it possible to review this industrial scene or to learn what management and foremost designers have seen for the year—or years—ahead.

When 1940 plans were being considered, a story "Of Things to Come" was told to a limited audience of interested executives by Briggs Mfg. Co., Detroit. Because Briggs' and the clients' interests and manufacturing

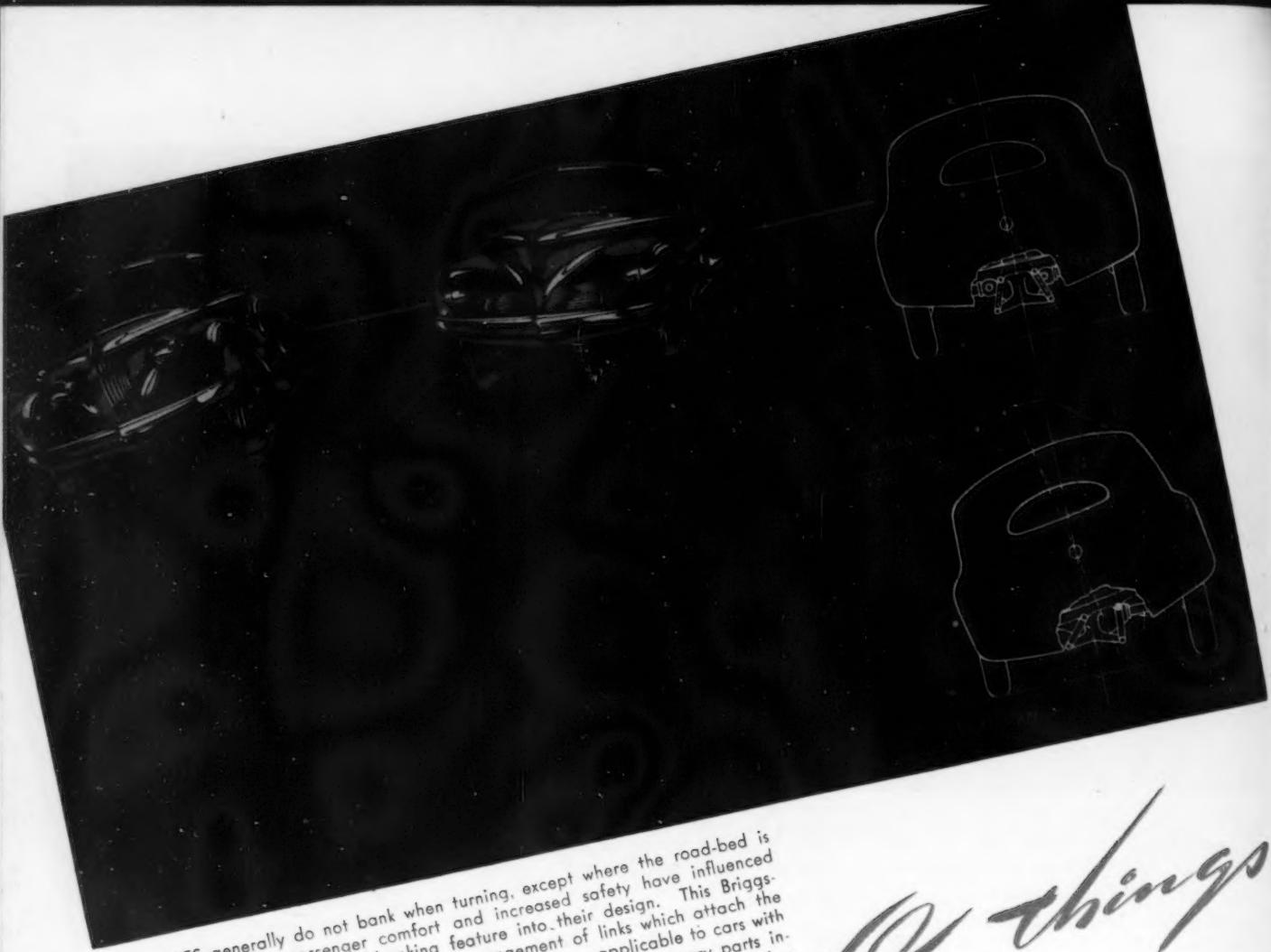
goals are quite widespread, suggested designs were not only automotive, but also included some illustrations and engineering sketches of household goods and other metal products. The story and pictures, modern as a world's fair, appeared only in a limited edition for this presentation, but *THE IRON AGE* has permission to reproduce some of the highlights of its pages.

One of the most revolutionary of the automobile designs shown in this "prospectus of the future" has been for some time in daily service as an inter-plant utility car in Detroit, subjected to routing usage that is more convincing than the usual tests. Other designs have been undergoing laboratory tests. Thus the ideas visualized draw importance from the fact that practicality is amply blended with originality. Under the apparent "artistic-

ness," there are new conceptions of mechanical design, new applications of basic principles, and innovations in methods of construction and use of materials.

In view of the widespread interest in rear-engine automobiles—and the possibility that the next major design changes will be the introduction of such models—there should be a great deal of interest in the type of construction which Briggs has laid out for rear-engine cars. Among the other important changes which are suggested by these pictures are those having to do with new suspension and balancing methods. Both of these are shown in the illustrations.

It will be noted that "functional design," currently the theme of one automobile firm's advertising, has been very much stressed in the designs which Briggs has suggested.



VEHICLES generally do not bank when turning, except where the road-bed is banked. Greater passenger comfort and increased safety have influenced engineers to incorporate a self-banking feature into their design. This Briggs-Kolbe device is an ingenious and simple arrangement of links which attach the axle to the frame and bank the body by centrifugal force, applicable to cars with solid or independent axles. Hotchkiss or torque tube drive. Necessary parts include six links, one rod, two coil springs, about sixteen rubber bushings and a somewhat modified steering hook-up.

Off things

"SMALL CARS" form the topic of much conversation in Detroit and elsewhere. This model, designed by Briggs, is easily converted from front engine position to rear engine drive, the engine position being clearly visible in the sketches. Note that the car is frameless; all strength-giving members are incorporated in the body structure. This type of automobile is already beyond the drafting board stage.



AT RIGHT

VISIBILITY through the windshield is improved in this design by greatly reducing the width of the engine hood and lowering the major part of the hood line to fender height. A modification of this idea may be seen in next year's cars.

• • •



to Come

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DETAILS of body hardware continually change and safety features play a more prominent part each year. Protruding handles and knobs are eliminated in these designs, and the door latch handle is a new sliding grip bar which prevents accidental opening of the door. Plastic panels decorate the doors and front seat back.



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A NEW idea in a unit for a small kitchen. With over-all length of 8 ft., there is included a stove, washing machine, sink and refrigerator, the latter being high, narrow and with two doors which require less room when they swing open. Sink faucets are mounted in the front. The washing machine washes, rinses and dries clothes automatically.

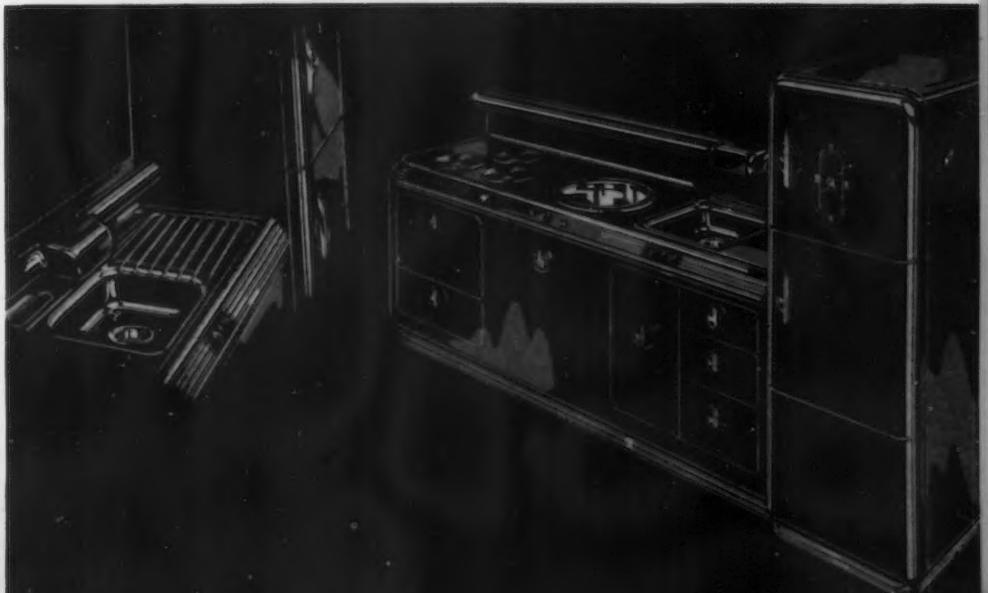


TABLE I

Reagents Used for Residual Chromium Determination

Sulphuric acid	10 per cent H_2SO_4 , by volume.
Sodium bicarbonate solution	8 per cent $NaHCO_3$, by weight.
Potassium permanganate	Approximately 0.01 N; 1 c.c. $KMnO_4 \approx 0.00017$ gm. Cr.
Ferrous sulphate	Approximately same strength as $KMnO_4$.
Silver nitrate solution	0.25 per cent $AgNO_3$, by weight.
Ammonium persulphate	15 per cent $(NH_4)_2S_2O_8$, by weight.
Hydrochloric acid	1 part concentrated HCl ; 3 parts H_2O , by volume.
Ortho-phenanthroline (ferroin)	0.025 Molar.
Titrating mixture	320 gm. $MnSO_4$, 640 ml. H_2SO_4 , 660 ml. H_3PO_4 , 350 ml. H_2O .

TABLE II

Results Obtained With Recommended Procedure on Synthetic Samples

Weight of Sample, Grams*	Added	Chromium, Per Cent		Error, Per Cent
		Total Present	Found	
10	None	0.005*	0.005	0.000
10	0.010	0.015	0.014	-0.001
10	0.020	0.025	0.025	0.000
10	0.030	0.035	0.035	0.000
10	0.041	0.046	0.045	-0.001
10	0.051	0.056	0.054	-0.002
10	0.061	0.066	0.065	-0.001
10	0.091	0.096	0.094	-0.002
10	0.101	0.106	0.104	-0.002

* Bureau of Standards certificate value 0.005 per cent Cr.

mination of residual chromium in selected steel samples by the usual $FeSO_4-KMnO_4$ method using large samples presented difficulties, and results were not always of the desired precision. Excessive amounts of ammonium persulphate were required to obtain complete oxidation of chromium. Electrometric titrations were of no particular aid over visual methods.

(b) *Indicator for Chromium Titration:*—Ortho-phenanthroline (ferroin), $(C_9H_8N_2)_4$, $FeSO_4$ has proved satisfactory as an internal indicator in the titration of chromium with ferrous sulphate and potassium permanganate. As the indicator itself contains ferrous ion, an indicator correction must be subtracted from the permanganate titration. This is made by titrating with potassium permanganate a blank solution containing the same amount of indicator as used in the determination.

(c) *Interference of Hydrochloric Acid:*—Experimental work showed that the small quantity of free hydrochloric acid remaining after precipitation of the silver nitrate catalyst with $HCl(1:3)$ was sufficient to cause low

ANALYSIS for Residual

FOR the past several years the chemical laboratory of Battelle Memorial Institute has determined small amounts of nickel, chromium, tin, manganese, copper, arsenic, antimony and the like in conjunction with an investigation on residual metals in open-hearth steel¹. Residual chromium in steel is commonly determined by a colorimetric method² which essentially consists of eliminating 90 to 95 per cent of the iron by precipitating the chromium with sodium bicarbonate in sulphuric acid solution, fusing the ig-

nited bicarbonate precipitate with sodium peroxide, leaching with water and comparing the yellow chromate color with a sample of known chromium content treated in a similar manner.

The colorimetric method for residual chromium is a laborious procedure and several years' experience has indicated that the accuracy and precision of the colorimetric method are not entirely satisfactory. One of the troubles is that the human eye is rather insensitive to changes in intensity of color in the yellow range. Color filters and photometers aid in the determination but most steel works laboratories do not have the required equipment.

Work was carried out to develop a rapid volumetric method of sufficient precision and accuracy for the determination of residual chromium in steel. The reagents used in the determination are shown in Table I.

(a) *Volumetric Methods:*—Experiments showed that the direct deter-

results for residual chromium in the $FeSO_4-KMnO_4$ titration. The error, due to the liberation of chlorine, has been confirmed by many workers³. The error resulting from this source was eliminated by addition of Zimmerman-Reinhardt solution, i.e., "titrating mixture," before titration.

Transfer of 10-gm. sample to a 600-ml.-beaker. Add 110 ml. 10 per cent, by volume, H_2SO_4 and heat on a hot plate until dissolution of the sample is complete. Dilute the solution to approximately 200 ml., heat to boiling, add an 8 per cent $NaHCO_3$ solution from a burette until a precipitate appears and then 4 ml. in excess. Boil the solution for one minute and separate the precipitate by filtration or by centrifuging, discarding the filtrate.

Wash the residue with hot water and transfer to the original beaker. Add 15 ml. H_2SO_4 and evaporate the solution to copious fumes of SO_2 . If necessary repeat the treatment until decomposition of the residue is com-

¹ Clyde E. Williams and John D. Sullivan, "Residual Metals in Open-Hearth Steel," Metals and Alloys, Vol. 3, 1932, p. 240. John D. Sullivan, "Residual Metals in Open-Hearth Steel," Metals and Alloys, Vol. 6, 1935, p. 134. John D. Sullivan and R. A. Witschey, "Residual Metals in Open-Hearth Steel," Metals and Alloys, Vol. 8, 1937, p. 99.

² Lundell, Hoffman, and Bright, "The Chemical Analysis of Iron and Steel," p. 300, John Wiley & Sons, Inc. (1931).

³ Treadwell and Hall, Analytical Chemistry, Vol. II, pp. 550-551, John Wiley & Sons, Inc. (1935).

* If the separation of precipitate from solution is done in a centrifuge, washing is effected by adding water to the centrifuge cup, breaking up the residue with a glass rod, and re-centrifuging.

plete. Add approximately 100 ml. water to the cool solution and boil until dissolution of salts is complete. Dilute the solution to about 300 ml. and add 5 ml. H_3PO_4 . Heat the solution to boiling, add 10 ml. $AgNO_3$ and 10 ml. freshly prepared $(NH_4)_2S_2O_8$ solution. Boil until oxidation of chromium is complete as indicated by the appearance of the permanganate ion. Continue boiling for 5 min., add 5 ml. $HCl(1:3)$ and boil 15 min. longer. Cool the solution to room temperature, add three drops O-phenanthroline (ferroin) indicator and a measured excess of standard ferrous sulphate solution. Add 10 ml. titrating mixture and titrate the excess ferrous sulphate with standard potassium permanganate. Subtract the indicator blank from the potassium permanganate titration and calculate the percentage of chromium present.

The accuracy of the method was determined by analyzing synthetic samples containing known amounts of chromium. Synthetic samples were prepared by adding increments of chromium as sodium chromate to a sample of Bureau of Standards Steel

TABLE III
Results Obtained With the Recommended Procedure on Open-Hearth Steel Samples Containing Residual Chromium

Sample	Weight of Sample, Grams	Results	Per Cent		Average Deviation
			Chromium	Average	
A	10	0.068, 0.067	0.068	<0.001	<0.001
		0.067, 0.058			
B	5	0.066, 0.064, 0.064	0.065	0.001	<0.001
	10	0.065, 0.064			
	15	0.065			
C	10	0.024, 0.023	0.024	<0.001	<0.001
		0.024, 0.025			
D	10	0.022, 0.023	0.023	0.001	<0.001
		0.022, 0.024			
E	10	0.007, 0.005	0.006	0.001	<0.001
		0.007, 0.005			
F	10	0.031, 0.032	0.030	0.001	<0.001
		0.030, 0.028			
G	10	0.091, 0.090	0.090	0.001	<0.001
		0.088, 0.091			

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Chromium in Steel

No. 8e dissolved in the manner described above.

Results of determinations made by the recommended procedure on synthetic samples of steel are given in Table II. The precision of the method is shown in Table III. Table IV gives results on five National Bureau of Standards steel samples containing small amounts of chromium.

The data given in Table II show that results accurate to about ± 0.001 per cent of chromium can be obtained in the analysis of steel containing 0.01 to 0.1 per cent of chromium.

The results in Table III obtained by two analysis working independently on samples submitted by various plants cooperating in the residual metal study show that the precision of the recommended method is excellent.

Table IV shows that the results obtained on National Bureau of Standard samples by the Battelle procedure were in excellent agreement with Bureau certificate values.

TABLE IV
Results Obtained With Recommended Procedure on National Bureau of Standards Samples Containing Residual Chromium

Bureau of Standards Sample	Weight of Sample, Grams	Chromium, Per Cent			Value by Battelle Procedure
		Bureau of Standards Certificate Values	Bureau of Standards Ferrous Laboratory	Recom-mended Value	
No. 8e	10	0.003 to 0.006	0.004	0.005	0.005
No. 12d	10	0.008 to 0.020	0.015	0.015	0.014
No. 15b	10	0.055 to 0.072	0.066 0.058*	0.064	0.067
No. 16c	10	0.038 to 0.050	0.046	0.045	0.047
No. 20c	10	0.047 to 0.06	0.056	0.055	0.058

* Colorimetric method.

New Specifications FOR METALS

AN unusual number of changes, revisions and additions to specifications for metals were recommended recently at the Committee Week meeting of the American Society for Testing Materials, in Columbus, Ohio. The Society will issue its triennial Book of Standards this year and consequently all of its committees have concentrated on bringing various specifications and tests up to date.

In Committee A-1 on steel, Sub-Committee VI on steel forgings and billets recommended a new specification providing for seven classes of forgings, to replace the carbon steel requirements in the three existing specifications A 18, A 19 and A 20. The tensile strengths of the various grades range from 47,000 to 90,000 lb. per sq.in., with yield points of 25,000 to 55,000 lb. per sq.in. The committee will also recommend a new specification covering alloy steel forgings for action at the annual June meeting of the society.

Sub-Committee VIII on steel castings recommended the adoption as standard of the specification covering carbon steel castings for miscellaneous industrial uses (A 27). The most important action of this sub-committee was the submission for approval of new specifications for carbon steel castings for miscellaneous industrial uses suitable for fusion welding. Eight grades of material were covered, with the maximum carbon content of 0.25 or 0.35 per cent and maximum man-

ganese at 0.70 per cent, but with a special provision for an increase in manganese for a reduction below the maximum carbon content. This new specification will, it is expected, fill a strong demand for standardized requirements for this type of material.

Sub-Committee IX on steel tubing and pipe approved, subject to ballot, new specifications covering alloy-steel boiler and superheater tubes. Thirteen grades of material are set up, nine of which are ferritic and four austenitic types. The ferritic type has a minimum tensile strength of 60,000 lb. per sq.in., and a yield point of 25,000 lb.; the austenitic type calls for 75,000 lb. per sq.in. tensile strength and 30,000 lb. per sq.in. yield point. A new specification will be presented shortly, covering electric-resistance-welded steel boiler tubes for high pressure service.

Sub-Committee XI on boiler steel plans to meet a demand for requirements for a higher strength rivet steel than the present specifications (in A 31, which range from 45,000 to 55,000

A.S.T.M. Pushes Work on Revisions in Preparation for New Book of Standards

lb. per sq.in.) by adding a second grade with a tensile strength range of from 58,000 to 68,000 lb. per sq.in.

Report on Farm Fencing

Committee A 5 on the corrosion of iron and steel discussed a very important subject, the first report of the committee in charge of inspection of the extensive wire tests involving thousands of specimens of farm-field fencing, barbed wire, unfabricated wire, wire strand and chain link fences, which are being carried on from coast to coast for the purpose of determining the effect of such factors as base metal composition, gage, type of coating, weight of coating, etc., on the serviceability of zinc-coated strand, barbed and woven wire fencing and unfabricated wire. A number of the bare wire samples and coated samples have been subjected to tension tests and the data will be published in the 1939 report of Committee A 5.

Revisions will be recommended in several existing specifications for protective coatings on wire and wire

products, including electrodeposited coatings on steel. Proposed methods of determining the thickness of electrodeposited coatings will be recommended as a new tentative standard. The Preece test, which is under serious consideration, will in the future cover only tests for determining weight of coatings and will not include uniformity of coating. A general method for conducting the Preece test, for uniformity of coating is being prepared, which will include the procedures given in A 191 and A 208 for use on zinc-coated iron or steel wire, steel castings, forgings and related shapes, bolts, nuts, etc.

Committee A 7 on malleable iron castings recommended the adoption as standard of the specifications for cupola malleable iron with a minimum tensile strength of 40,000 lb per sq.in., minimum yield point of 30,000 lb. per sq.in., and elongation of 5 per cent in 2 in.

A special sub-group of Committee A 10 on iron chromium, iron-chromium-nickel and related alloys has examined installations of plain chromium and chromium-nickel-steel in use for architectural purposes in New York, Philadelphia and Atlantic City. The 1939 report will include the results of these inspections, giving the chemical compositions of the materials, methods of fabrication, etc. Sub-committee X recommended the adoption as standard, with minor revisions, of eight existing specifications for various chromium-nickel alloy steel castings, covering all except 12 to 14 per cent chromium steel.

Salt Spray Proposed

Committee B 3 on corrosion of non-ferrous metals and alloys took a number of important actions. They recommended a proposed standardized method of salt spray corrosion testing for non-ferrous metals and alloys. They have undertaken a cooperative series of accelerated laboratory tests, using the total immersion procedure on both aerated and non-aerated solutions. In the accelerated laboratory test project, the four cooperating laboratories will use six kinds of metals in each of the three different solutions: sodium chloride, sodium hydroxide and sulphuric acid. The results of these tests should be included in the 1940 report.

The committee on salt spray testing has prepared a proposed tentative procedure describing the apparatus and the methods to be followed. (It does not, however, attempt to specify the requirements which should be met by any product.)

Sub-Committee VIII on galvanic and electrolytic corrosion will report this year on the results of the inspection of about 20 different metal combinations which have been on exposure at various test locations for about seven years. This committee will also give the results of preliminary tests carried out on combinations of six different metals immersed in sea water.

The first undertaking of a new group which has been organized for developing specifications will probably deal with electroplated coatings on non-ferrous metals.

The annual report of Committee B 3, to be published in 1939, will include corrosion data which are expected to be of vital interest.

Under the work of Committee B 5 on copper alloys cast and wrought, the sub-committee on copper-zinc sheet and strip reported the completion of new specifications for leaded brass sheet and strip to be submitted to the meeting in June for publication as tentative. The group on copper-tin sheet and strip presented a recommendation for the addition of a new alloy of leaded phosphor bronze in the tentative specifications B 103. New proposed specifications were also presented for copper-nickel-zinc and copper-nickel sheet and strip. New specifications were recommended for beryllium-copper including sheet, strip, wire and rod. The tentative specifications for copper-silicon alloy plates and sheets (B 96) and sheet copper-silicon alloy (B 97) were recommended for adoption as standard, as were also tentative specifications for copper-silicon alloy wire for general purposes (B 99).

Because the revisions were so extensive, new specifications will be published as tentative for copper pipe standard sizes (B 42) and seamless copper tubing, bright and annealed (B 68). Revisions will also be made in specifications for seamless copper tubes (B 75) and copper water tube (B 88) and brass pipe standard sizes (B 43). Specifications for miscellaneous brass tubing are being prepared.

The sub-committee for copper-base alloys for sand castings recommended for adoption the tentative revisions of the specifications for manganese bronze ingots for sand casting (B 7) and manganese bronze sand castings (B 54). A new revision was approved to include standards for high tensile strength manganese bronze alloys. The sub-committee also presented new tentative specifications for nickel-silver

casting alloys to cover four alloy compositions.

An important action under way is the consideration being given to the establishment of a classification of appropriate nomenclature for the groups of alloys. A classification has been written of the cast copper-base alloys for foundry purposes which is recommended for publication as tentative this year.

Under the work of Committee B 6 on die cast metals and alloys, changes have been recommended in the tin and copper contents of alloy No. 2 in the specifications for lead and tin base alloy die castings (B 102) to allow for an increased range of 80 to 84 per cent tin and 4 to 6 per cent copper respectively.

In the specification for magnesium base alloys for die casting (B 94) one new alloy designated as "13" has been proposed with the following suggested composition: aluminum 8.3 to 9.7, manganese 0.013 minimum, zinc 0.4 to 1.0, silicon 0.5 maximum, copper 0.05 maximum, nickel 0.03 maximum, others (cadmium and tin) 0.3 maximum, the balance being magnesium.

A new specification will be issued covering aluminum base alloys in ingot form for die castings. Existing tentative specifications for magnesium ingot and stick for remelting (B 92) will be voted on for adoption as standard.

Revisions have been proposed in the following existing specifications: aluminum base alloy in ingot form for sand castings (B 58) and for permanent mold casting (B 112); aluminum alloy sheet and plate (B 78) and aluminum bars, rods and shapes (B 89).

Du Pont Develops New Enamel

A NEW enamel for industrial finishing has been announced by the du Pont Co., Wilmington, Del. Known as low-bake "Dulux" enamel, it is said to speed up production in low-temperature ovens. The following baking schedules are possible: One-quarter hour at 250 deg. F.; one-half hour at 225 deg. F.; one hour at 200 deg. F.; two hours at 175 deg. F.

The new finish is said to have excellent gloss and build, print resistance, and retained flexibility. It is said to be wrinkle-proof under all normal conditions, and it gives satisfactory hiding in one coat when applied on solvent-cleaned steel, bonderized steel or primed steel. White and colors are available.

Steel Quality AS RELATED

THE performance of a steel during hot-working as well as the merit of the resulting product depend on the inherent quality of the steel itself, and on the conditions imposed on the steel during heating and working. So many factors may be involved, some of which are but imperfectly understood, that it would not be easy to lay down anything in the nature of a comprehensive set of governing rules or laws; nevertheless, there is sufficient knowledge of some of the most important factors to justify conclusions which may be of value in practical work.

Composition is, of course, of great importance and must be related to the properties required in the final product as well as to the methods of production. As far as plain carbon steel is concerned, carbon has a greater effect than the other common elements on the malleability at high temperatures. The effect of carbon is really two-fold; as it decreases the steel becomes softer and more malleable at any given temperature, while, at the same time, it becomes possible to heat to higher temperature and so take advantage of the increase of softness or malleability with temperature.

At high forging temperatures, the stiffness of a steel varies almost linearly with temperature, but this is not true of all temperatures. There is a discontinuous change at the critical points which leads to the steel being more plastic when the temperature is within the critical ranges than when the temperature is either lower or slightly higher. This is no mere scientific curiosity, but it is a fact which may be observed during certain hot-working operations, and is sometimes confused with recalescence effects which may also occur at the critical points. As an illustration of the fact mentioned, if a uniform bar of steel is pulled in

tension with its middle temperature about 1740 deg. F., and decreasing towards the ends, it will not "neck" at the center but at two points on either side of the center where the temperature lies in the critical range. The greater strength of the gamma-iron

sile properties. A case of this is shown in Table I by the increased output of a typical strip mill when rolling basic Bessemer mild steel as against open hearth mild steel.

Similarly, basic Bessemer steel will roll to a thinner section on a particular roll setting. This makes it possible, for example, to roll strip to, say, one gage lighter than the accepted rolling mill minimum, based on open hearth steel practice. The greater malleability of basic Bessemer steel is explained by its low content of elements which interfere with free flow of the iron base, for example, carbon, silicon and minor impurities such as copper, nickel and tin. Impurities like

TABLE I Comparative Output of a Strip Mill		
Range of Sizes, in Inches	Siemens Steel, Tons per Hr.	Bessemer Steel, Tons per Hr.
10 to 8½	20	25
8 to 7½	23	26.25
6¼ to 6 1/16	25	27.5
5½ to 5¾	24	26.25
4 5/16 to 4 1/16	23	25.5
3 3/8 to 3 3/16	21	25
2 11/16 to 2 1/2	12	18

Furnace Fuel, Temperature and Time	Number of Roots on 14.5 mm. Lengths	Average Depth of Roots, mm.	Maximum Depth of Roots, mm.
Coke oven gas, 2010 deg. F., 2 hr.	52	0.100	0.185
Purified coke oven gas, 2010 deg. F., 2 hr.	12	0.03	0.05
Muffle furnace, atmosphere air, all temperatures up to 2370 deg. F.	nil	nil	nil

condition above the critical points is, of course, the basis of the high temperature strength of modern austenitic steel in which the allotropic change is suppressed by alloy conditions. These steels are much stronger at high service temperatures of about 930 to 1650 deg. F., than are any of the ferritic steels. There is another discontinuous change at lower temperatures where the steel is appreciably stiffer at about 390 deg. F., than at higher temperatures or at atmospheric temperature, but this is of little or no interest in connection with normal hot-working.

Steels made by different processes may show interesting and useful differences in malleability at high temperatures even where the finished products show substantially equal ten-

those mentioned are present in open hearth steel, sometimes in quite large amounts, and arise from the use of mixed scrap which is essential to the economy of the open hearth process, but which is not used in the basic Bessemer process.

Some of the elements in ordinary steel and in low alloy steels have little effect on the malleability or stiffness at high temperatures, but may have other effects of importance either during hot-working itself or as regards the merit of the finished product. In the former class are elements which produce, by their absence or presence, a type of brittleness or hot-shortness which is well-known to occur, for example, in ingot iron in a range of temperature which appears to extend for

*Lecture presented before the Midland Metallurgical Societies, Birmingham, England.

TO HOT WORKING PROPERTIES*

about 360 or 540 deg. F. above the highest critical point. This kind of hot-shortness is affected in ordinary steels by the manganese-sulphur and oxygen contents.

A good deal of work has been done on this subject in various parts of the world, but some of the conclusions reached are of little value in relation to industrial hot-working processes, for two main reasons. First, that the relationship has been extended to cover highly oxidized bath samples completely unrepresentative of commercial steels, and second, that the question of oxygen content is a very difficult one, both in regard to obtaining reliable figures for the oxygen content of a

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D.Sc., Ph.D.

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that if the manganese in mild steel falls below about 0.20 per cent, there will be a danger of trouble regardless of the sulphur content. It appears also that steels worked immediately after solidification require a higher manganese-sulphur ratio to ensure freedom from hot-shortness, but such information, while of possible interest to sample passers, is of little interest to roll-

some as "segregated" steel—is, in fact, superior to killed or so-called "uniform" steel, in many respects. Rimming steel gives a superior surface, owing to its purity and self-welding properties, especially when it is made from virgin sources as in the case of Bessemer steel, that is, without the use of miscellaneous scrap. It is also as good as, and in some cases superior to killed steel, where the interior of the steel is opened out during the manufacture of hollow bodies, or where the steel is subjected to longitudinal compression. Its superiority in the latter case depends on its freedom from the axial segregation which is prone to occur in killed steels unless very carefully made to avoid this defect.

Rimming steel has also advantages in the uniformity of distribution of non-metallic particles. This depends largely on the fact that rimming steel is relatively free from deoxidation products, and, in particular, silicates, which may form objectionable aggregates either in the surface layers or at certain parts of the interior, owing to their coalescing power during pouring and solidification. Intermediate forms of steel between killed and rimming are also available and, in some cases, have definite advantages over these common forms. Rimming steel may be modified to give the same characteristics but with a shallower envelope and with a more diffused core.

TABLE III
Relation Between Steel and Surface Rooting

Steel	Furnace Fuel, Temperature, and Time	Number of Roots 14.5 mm. in length	Average Depth, mm.	Maximum Depth, mm.
Armco	coke oven gas	66	0.101	0.150
3½ per cent nickel steel	purified coke oven gas	13	0.077	0.125
1 per cent copper steel	coke oven gas	44	0.103	0.150
6 per cent chromium, ½ per cent molybdenum steel	purified coke oven gas	32	0.041	0.075
0.438 carbon steel	coke oven gas	31	0.075	0.125
Basic Bessemer steel, copper 0.01, nickel 0.024 per cent	purified coke oven gas	10	0.049	0.075
	coke oven gas	12	0.015	0.015
	coke oven gas	22	0.031	0.06
	coke oven gas	22	0.036	0.08
	purified coke oven gas	6	0.016	0.03

Temperature 2010 deg. F., time 2 hr. throughout.

steel, and in regard to the forms in which oxygen may exist in a steel.

It appears certain that oxygen occurring in the amounts possible in commercial steel is not of real importance, and that the provision of an adequate ratio of manganese to sulphur is quite sufficient to ensure freedom from hot-shortness. A ratio of five should be more than ample for practical purposes, but it must be noted

ers who invariably use steel from soaking pits or some other heating furnace.

Type of steel and uniformity are of great, or even greater, importance than composition, and there are many current misconceptions in regard to these factors. Experience and development work have shown, for example, that rimming steel—which has been unjustly criticized and labeled by

TABLE IV
Melting Points of Sulphides and Oxides

	Melting Point, Deg. F.
Ferrous oxide, FeO	2500
Ferrous sulphide, FeS	2110
Manganous oxide, MnO	3090
Manganous sulphide, MnS	2950
Cuprous oxide, Cu ₂ O	2240
Cupric oxide, CuO	1950
Cuprous sulphide, Cu ₂ S	2010
Nickel sulphide, NiS	1470
Chromic sulphide, Cr ₂ S	2940



This type of steel retains the advantages arising from a pure envelope, and, at the same time, gains in general uniformity, a fact which is reflected in the increase of usable steel from an ingot.

The welding quality of rimming steels should not be overlooked, particularly in the case of low carbon basic Bessemer steels. These can be used with great success for processes in which welding is practically instantaneous and give excellent results where killed steels cannot be made to satisfy the manufacturing conditions.

Before leaving the question of the general merit of a steel for hot-working operations, a few remarks may usefully be made regarding the effects of forging or hot-rolling. Many of

the effects are well-known, such as break-down of the casting structure, filling and welding of gas cavities and break up or elongation of non-metallic particles or groups. These need not be discussed here, but attention may be directed to some lesser known effects, particularly when they are considered in relation to the desirability for normalizing.

There is a tendency in some quarters to attempt to force producers into normalizing after hot-forging or rolling, and it is assumed that normalizing will produce useful effects and overcome objectionable features present in the rolled or forged products. It is not generally realized, however, that a hot-worked product may have superior properties in the hot-worked

At high forging temperatures, the stiffness of a steel varies almost linearly with temperature, but this is not true of all temperatures. There is a discontinuous change at the critical points which leads to the steel being more plastic when the temperature is within the critical range, than when the temperature is either lower or slightly higher.

condition, and that even the best normalizing could do nothing but injure the general properties, while in the case of incorrect normalizing, serious injury may be produced. Admittedly, particular cases may require special consideration, but it happens that many forging or rolling operations are conducted so that a refinement of grain size to a much smaller size than normal is produced. This results in great toughness in the hot-worked product, as can be seen by comparing the impact values of hot-worked pieces with the same pieces normalized.

Hot-worked steel, particularly steel of low or medium carbon content, may easily have 50 or even 100 per cent higher impact value in the hot-worked condition. Incorrect normalizing, that is, between the critical points, may also reduce the impact value to only 5 per cent, or even less, of the best value in the case of mild steels or low alloy steel of low carbon content, which have a considerable temperature gap between the critical points. In regard to tensile properties, including elongation and reduction of area, a well-rolled product, unless of air-hardening steel, will not suffer in comparison with normalized steels except sometimes in limit of proportionality; this may be lower to the extent of two or three tons per sq. in., in the rolled product, but the yield point itself is not affected to nearly the same extent.

It is worth noting that the ductility of carbon steels increases with time after hot-working. This is reflected in the elongation, and, to an even greater extent, in the reduction of area, which may be nearly doubled by aging. The greater part of this increase occurs, however, within the first few hours or days after hot-working, and is not likely to be of practical importance except in cases where steel is put into service very quickly after fabrication, or where the steel is over-

stressed in the later stages of working.

Attention has been drawn to an increasing extent in recent years to steels containing copper. This element has, of course, been used in small percentages for many years for increasing the resistance to atmospheric corrosion of mild steel, but still greater amounts are useful for increasing the general strength properties, including yield point, and for making use of precipitation-hardening effects, which can be brought about by simple heat treatment of "as-rolled" products. Copper is, of course, attractive as an alloy addition because of its low price when compared with most other alloy elements available.

Copper Solubility Limited

There are many disadvantages, however, in making use of copper as an alloy element. In steel making and hot-working practice these disadvantages are connected with the same underlying reactions as are regarded as of value when heat-treating the final product, and depend upon the limited solubility of copper in iron. Copper is the only element, at least among those commonly available, which has such a limited solubility. Red-shortness is a feature of copper-bearing steels when the copper element is present beyond a certain amount. This amount has been put variously as 2 per cent or 4 per cent, but in actual fact steels with copper of 1 per cent may, under certain circumstances, give serious trouble both at the ingot stage and during hot-rolling.

The trouble referred to is a disintegration of the steel, either confined to the surface layers or deep-seated in the steel, and is distinct from the surface cracking which may arise after oxidation in steels containing as little copper as 0.20 per cent. The latter type of fault is of interest to those engaged in hot-working, and arises again from the limited solubility of copper in iron. The iron is preferentially oxidized until the copper becomes concentrated above the limit of solid solubility in iron, beyond which copper (or a constituent rich in copper) separates out of solution. If the temperature is above the melting point of copper, the latter penetrates the grain boundaries of the steel and causes disintegration of the surface into a characteristic crocodile-leather pattern when the steel is deformed by hot or cold work. Current theory is that this effect can be avoided, or at least minimized, by addition to the

steel of nickel to the extent of about one-half the copper content. The only other element of value in this way is said to be cobalt, but it is apparently not so effective. No doubt these elements produce some effect in the particular cases to which they are applied, but it would be a mistake to extend this theory to cover all cases of surface cracking. The facts are that surface cracking can occur in a minor degree, but sufficiently objectionable to injure the surface finish in bright drawn or rolled articles, even when little or no copper is present in the steel, and at temperatures well below the melting point of copper.

In the case of the features referred to, copper itself can seldom be distinguished in the intergranular films or "roots" which run into the steel from the surface, except, of course, when the copper is high. The main source of trouble in this connection is sulphur, or sulphur compounds present in the furnace atmosphere. The figures in Table II are typical of many other results will serve to illustrate results obtained by heating the same steel in sulphurous and non-sulphurous atmospheres.

Heating at any temperature from 1650 deg. F. upwards results in surface rooting of the scale, but at temperatures of 1290 deg. F., and less, the trouble appears to be absent. As might be expected, in a selective process of penetration, the rate of scaling is important. It is necessary to have oxidation in progress, but if it is proceeding too rapidly the selective process gets no time to develop, the surface being wasted away too rapidly. An extreme illustration of this, and also of the powerful effect of sulphur dioxide on a steel is seen when steel is heated in an atmosphere of pure sulphur dioxide at about 1830 deg. F., when, in the space of a few minutes, a large laboratory sample of steel is reduced completely to cinder. On anal-

ysis, this is seen to consist of a mixture of oxide and sulphide.

The nature and type of steel has an effect on surface rooting and cracking, as will be seen from the data in Table III. From these figures it will be seen that nickel accentuates the effect, which is contrary to the theory of its beneficial effect in copper steels. Chromium in large quantity greatly minimizes the effect, but probably not in quantities below, say 1 per cent. Carbon acts in the way of a restrainer, presumably because it must be oxidized and diffuse outwards before rooting commences. The minor impurities present in open hearth steels lead to a greater susceptibility to this trouble than in the case of basic Bessemer rimming steel which, of all mild steels tested, is easily the most immune, owing to its purity in minor constituents and the relative purity of the envelope or surface portion of the steel.

Sulphur, of course, is known to increase the rate of scaling, and it is evident that sulphides enter into the mechanism of rooting. Analysis of scale after heating in a sulphurous atmosphere shows high sulphur while general consideration of the effect of added elements, particularly nickel and chromium, point strongly to the sulphides and their melting points being the crux of this matter. The melting points of some common sulphides and oxides are given in Table IV.

Eutectic systems of low melting point almost certainly are involved in the question, some of the eutectics, which are of known very low melting point, being recognizable under the microscope. An example is the FeO-FeS eutectic, melting at 1725 deg. F. It is clear, however, that if the furnace atmosphere is properly adjusted and controlled, and the best type of steel used when possible, no trouble in practice from surface cracking of this type need be anticipated.

PHOTOGRAPH of a spring cut from a standard transverse test bar of Pomoloy, minus any special treatment, illustrates the resiliency and the high machineability of the iron. This cast iron spring can be bent into a U-shape and stretched or compressed and will resume its original shape.



Recent Design Changes in Motors, Controllers and Lighting Equipment

By FRANK J. OLIVER

Associate Editor, *The Iron Age*

IMPROVEMENTS in design and extension of the range of size of explosion-proof motors feature recent announcements of the motor manufacturers. Among controllers innovations are offered in across-the-line starters as well as in heavy amperage equipment for mill service. Improvements have been made in insulation

for magnet and switchboard wire, allowing greater flexibility without danger of cracking the skin. Industrial lighting equipment makers have been busy developing fixtures for the new high efficiency fluorescent tube lamps which have received wide acceptance in the last year.

THE Louis Allis Co. of Milwaukee, which pioneered the explosion-proof motor 10 years ago, announces another new line of both a.c. and d.c. explosion-proof motors, styled in the modern manner. Greater dependability, convenience, long life and safety in hazardous locations are claimed. Heavy gray iron castings are used for the stator housing and end bells and for the heavy integral feet. Ribbed construction is used on the outside of the housing for greater strength and greater radiation surface for cooling. A heavy rust-proofed steel cover directs the blast of

cooling air over the fins. Fan is of aluminum alloy, with split hub and double bolt and keyed lock to shaft.

Ball bearings, normally supplied, are mounted in cartridges for grease lubrication. End bells may be removed without disturbing the bearing enclosures, or the bearings may be inspected with-



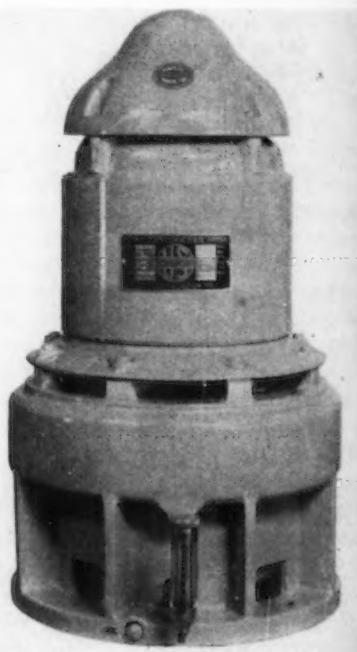
A FACTOR of safety of five against any likely internal explosion, extra wide metal-to-metal fits to prevent the escape of any hot flame and the ability to operate sufficiently cool to prevent ignition of surrounding atmosphere are the principal safety features of the new line of Louis Allis explosion-proof motors.



HEREFORE limited in size from $\frac{1}{4}$ to 10 hp., the polyphase and single-phase explosion-proof motors made by the Howell Electric Motors Co., Howell, Mich., have been extended in range up to 40 hp. The illustration shows a totally enclosed, fan-cooled frame. All these motors are approved for class I, group D locations, where inflammable liquids or gases are manufactured, handled or stored.

out removing the end bells. The L-A bearing guards are retained to make the enclosures resistant to a direct

stream of water. An extra large, four-directional conduit box is mounted in the center of the motor frame for



YNCROGEAR unit type GDV, complete with flange base, is a vertical type geared head motor recently designed by U. S. Electrical Motors, Inc., of Los Angeles (Eastern plant, 80 34th Street, Brooklyn). Gear train is a helical type and ball or roller bearings are used throughout the drive. A feature is a small geared pump that supplies oil to bearings, gears and pinions. Reduction range is from 1800 to 8.3 r.p.m. Available in sizes from $\frac{1}{4}$ to 15 hp.

making conduit connections from any direction.

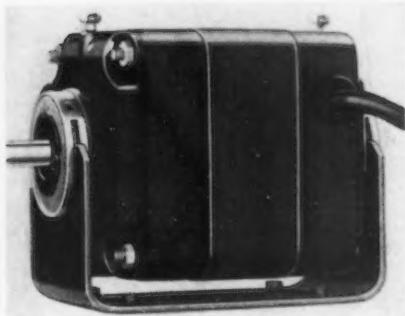
Sub-Fractional Horsepower Motor

ASMALL horsepower motor is being furnished by the Ohio Electric Mfg. Co., 5908 Maurice Avenue, Cleveland, that may be wound

either as a shaded pole type in sizes from 1/200 to 1/80 hp. or as a permanent split capacitor type in sizes from 1/150 to 1/20 hp. at 3400 r.p.m. The small capacitor may be mounted on the motor or separately. When operated in the latter manner, the efficiency is approximately double that of the shaded pole motor; that is, for equal horsepower ratings, the wattage is halved for the capacitor type. Start torque is slightly above full load and maximum running torque about four times full load. Standard wool fed sleeve bearings are used.

Across-the-Line Starters

THREE new types of linestarters designed for across-the-line starting of squirrel cage motors have recently been announced by Westinghouse Electric & Mfg. Co. The De-ion

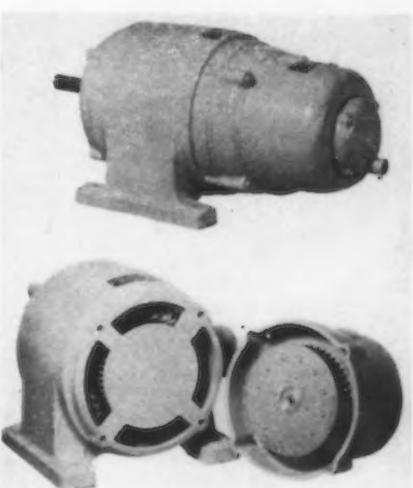


THIS Ohio square motor, measuring 3½ in. square by 4¾ in. long, with ¾ in. shaft, is wound for shaded pole or permanent split capacitor operation and is furnished in sub-fractional sizes.

Motor Watchman is a low cost manually operated type for starting and stopping motors up to 7½ hp. The De-ion combination linestarter may also be used as a primary switch for wound-rotor induction motors. It consists of a magnetically operated linestarter and a manually operated motor circuit switch combined in the same streamlined cabinet. With the insertion of one padlock, the unit can be locked in off position and the door locked shut. Heretofore, two padlocks were required for this additional safety. The starter has fuseless circuit protection by an instantaneous magnetic trip circuit breaker. Resetting is done by moving the external handle, the position of which indicates whether the breaker is on, off or tripped.

The new Westinghouse non-reversing linestarters are for large squirrel cage motors and wound-rotor induc-

tion motors requiring push button or remote control where across-the-line starting is permissible. The linestarters come in four sizes, ranging from 300 to 1200 amp. rating and from 100 to 400 hp. respectively at 220 volts and from 200 to 750 hp. at



DEIGNED for frequent reversals at full voltage (as high as one reversal per sec.) this squirrel cage motor is provided with forced ventilation by means of a small auxiliary motor and squirrel cage fan mounted on one end bell. Rotor is a special high resistance type. Stator windings are mica-besitos insulated. Frame, shaft and ball bearings are of sturdy design. Available in a number of sizes and speeds up to 10 hp. from Sterling Electric Motors, Inc., Telegraph Road at Atlantic Boulevard, Los Angeles.

440/600 volts. All ratings are two or three phase, three wire.

Distinctive features of the units include low-voltage protection or release through low-voltage relay, bimetal type of overload relay, hand or auto-



THE Westinghouse De-ion Motor Watchman is a manually operated across-the-line starter for squirrel cage motors up to 7½ hp.

matic reset, saturated current transformers insuring adequate protection on slow starting applications, and strong magnetic blowouts insuring adequate arc-rupturing capacity.

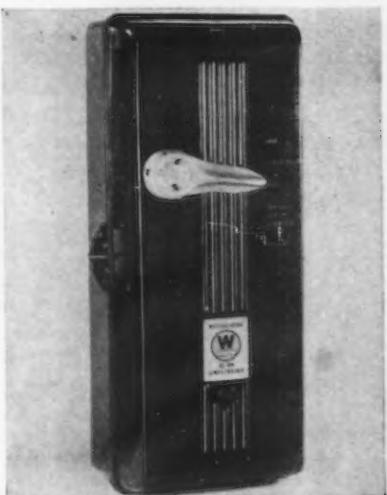
Master Switch

ANOTHER Westinghouse development is a new type of heavy duty master switch for a.c. or d.c. control circuits on cranes, hoists, roll and transfer tables, coke pushers and similar mill applications. Positive operation results from the cam opened, spring closed arrangement. Use of a star wheel and two pawls gives a definite "feel" for the off position and the five operating points. A shallow cast iron base and deep cover with wide flanges make the case weatherproof and provide accessibility for inspection and wiring.

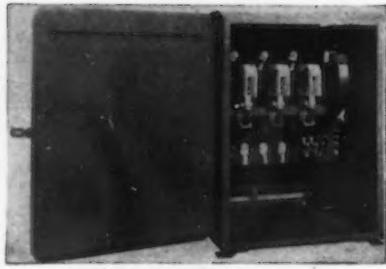
Heavy Duty Circuit Breakers

ALSO for mill service and other similar applications are the new Westinghouse type AB-20 De-ion air circuit breakers of 20 000-amp. interrupting capacity. They are available in wire size ratings from 70 to 600 amp. and for voltages up to and including 600 on a.c. and 250 volts on d.c. Silver alloy contacts assure positive contact and long life. Besides thermal trip elements calibrated with inverse-time characteristics, these breakers have instantaneous magnetic trips operating at nine to 10 times thermal rating to take care of short circuits.

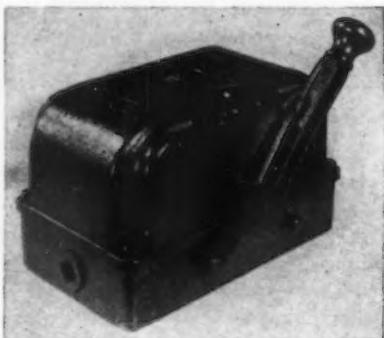
Breaker housings are made of Moldarita, having adequate strength and resistance to moisture. Barriers be-



NEW Westinghouse De-ion combination linestarter, designed especially for the across-the-line starting of squirrel cage motors or as a primary switch for wound rotor induction motors.



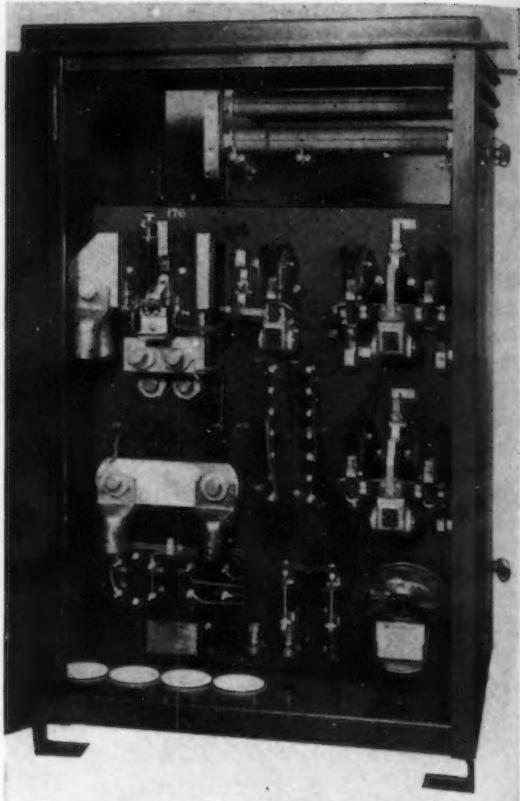
WESTINGHOUSE class II-200-G non-reversing linestarter for squirrel cage and wound rotor motors up to 400 hp. at 220 volts.



AT RIGHT
CONTROL side of the new Westinghouse load measuring and automatically reclosing feeder sectionalizer panel for mines and other underground or outdoor application. The panel is rated at 1600 amp., 375-volt d.c. and is located upright in the middle of a rugged cabinet of $\frac{1}{2}$ -in. steel. It is accessible from both sides by full size weatherproof doors. Air chute for the circuit interrupter is extended to the outside to vent gases from the cabinet.

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AT LEFT
A NEW type of master switch for mill and crane controllers is this Westinghouse type SM-25 five-point model provided for either hand or foot operation and for vertical or horizontal mounting



tween poles permit minimum spacing and small overall size.

Charge Control Unit for Stationary Batteries

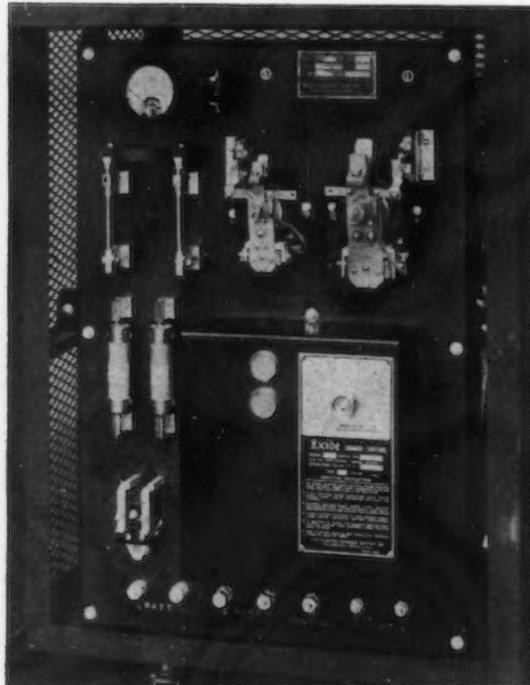
BECAUSE the use of storage batteries in stationary service has grown considerably in recent years, such as in control and tripping service in steel mills, the Electric Storage Battery Co., Philadelphia, has de-

veloped a charging control unit to reduce the amount of supervision required in keeping such batteries fully up to charge. The model ES control is designed for use with any of the following charging systems: either bulb or dry disk types of rectifiers; d.c. generators, or d.c. bus with charging resistors. Essentially the unit consists of an interval time switch, driven by a small synchronous motor, that starts the charge or increases it once every hour by resetting a temperature compensated relay, which in turn operates an auxiliary relay. As soon as the battery voltage rises to the operating voltage of the first relay, the

contacts open, de-energizing the auxiliary relay and stopping the charge. The automatic feature may be cut out for continuous charge, if desired.

Limit Switches

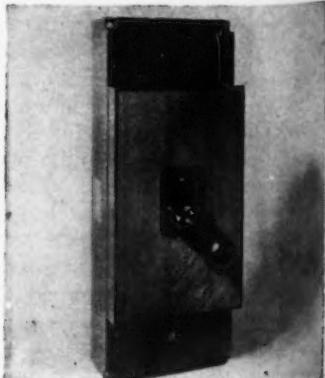
GENERAL ELECTRIC has developed a small size, snap-action limit switch claimed to operate slowly without contact burning and to be proof against oil and dirt around a machine. The switch may be mounted in any position and is enclosed in a die cast case, drilled to facilitate mounting on either back or side. Cover is gasketed and rod has a grease seal. Silver-to-silver, double break contacts are provided to assure long life. Two independent circuits allow for any contact arrangement.



AT LEFT
THE Exide automatic charge control unit has been especially designed for recharging stationary storage batteries such as are used in steel mill control and tripping service.

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AT RIGHT
FOR heavy mill service Westinghouse is offering the type AB-20 De-ion air circuit breaker of 20,000-amp. interrupting capacity.



Positive snap action is obtained by means of an over-center toggle mechanism. Either a roller lever or push rod head can be supplied.

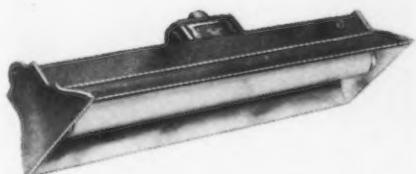
FOR application where small moving power is available to make or break circuits and where friction must be kept low, the *Micro Switch Corp.*, Freeport, Ill., is offering a roller leaf actuated limit switch. The leaf spring is ribbed to give it extra strength and carries at its end a $\frac{3}{8}$ -in. diameter roller by $\frac{3}{16}$ in. wide, case hardened and mounted on an oilless bearing. Either the standard or type Z Micro Switch can be obtained with the roller leaf actuator. Housing measures $2\frac{1}{2} \times 1\frac{3}{8} \times \frac{3}{4}$ in. The switch is of single pole construction and handles $\frac{1}{2}$ hp. It can be obtained with normally open, normally closed or double throw contact arrangements.

Magnet Wire

LESS space is required for insulation and protection of magnet wire with a new type of coating developed by *General Electric*; hence many electrical products can be reduced in size. In place of an enamel coating ordinarily composed of drying oil resins, Formex wire has a covering of a polyvinyl acetal type resin, which is tougher and more flexible. Tests show that Formex wire is considerably higher in resistance to abrasion and to the common treating solvents. It is said to withstand the operations of winding, assembly and varnish im-



MOTORS, heaters, solenoids and other electrical apparatus can be controlled from the action of cams, slides or rolls with the aid of the new roller leaf actuated Micro switch pictured above.



IVANHOE single trough, concentrating type reflector for the new fluorescent tubular lamps. Any number of units up to three may be obtained from the Miller Co. in a unit mount, in both concentrating and flood types.



UNIT section type of construction is used in the new Benjamin Flu-O-Line fluorescent fixture. Any number of the single lamp units shown may be attached end to end for long assembly bench illumination or they may be mounted side by side for more concentrated lighting.



THIS small, inexpensive snap-action limit switch has been designed by *General Electric* for use on machine tools, conveyors and other automatic equipment.

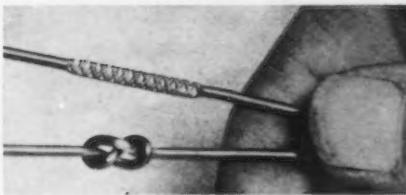
Inkless Recording Instruments

CONTINUOUS accurate operation for 30 days without attention, at temperatures as low as -10 deg. F. and as high as 120 deg., is made possible by the new type CF-1 line of inkless recording single and double-range a.c. ammeters and voltmeters just announced by the *General Electric Co.* The units are in the low-price range and are particularly well suited for voltage surveys and checking circuit load conditions. The mechanism uses a typewriter ribbon to make the record by a series of dots, resulting in greater simplicity, small size, and light weight. There is nothing to freeze in cold weather. A cast aluminum alloy case of modernistic design protects the mechanism. Although they are portable, the new instruments may be wall-or-pole mounted.

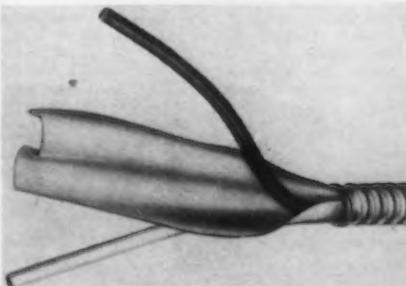
The chart is 4 in. wide and is driven by a Telechron motor at 1, 2 or 3 in. per hr. A second motor drives the typing mechanism. Voltmeters are listed for the double range of 0-140/280 volts; ammeters for the range 0-5/10 amp.

Fluorescent Lamp Fixtures

WITHIN the last year, the new fluorescent lamp has been applied to many types of industrial and



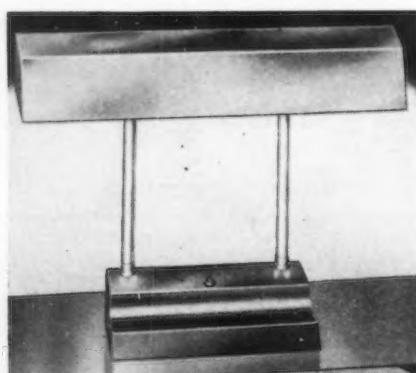
THE synthetic resin coating on G.E.'s new Formex magnet wire is so tough that the wire can literally be tied in knots without cracking the insulation. The upper sample has been squeezed between serrated vise jaws without failure of the coating.



AN S-shaped paper wrap is employed to increase the dielectric strength and ease of use of this new Blue-Bushed BX armored cable, announced by the *General Electric conduit products sales section*, Bridgeport, Conn. As soon as the armor has been removed, bushings can easily be inserted between the paper and the armor, thus providing additional protection for the conductors, which may then be untwisted and the paper torn off close to the bushing.

commercial lighting. In the fluorescent lamp, the electric energy is discharged across an atmosphere of ionized mercury vapor, between electrodes at opposite ends of a long, slim tube. This discharge is high in ultraviolet radiation, normally invisible. The inside walls of the tube are coated with special salts, known as phosphors, that transform the ultraviolet light into visible radiation. Each phosphor has its own characteristic color of radiation and any color combination, including white, can be constructed. The efficiency of the white light is twice that of an incandescent lamp; that of a blue light, 60 times because of the high absorption of the blue coloring on the latter. Both *General Electric* and *Westinghouse* introduced lamps of this type last year.

BENJAMIN Flur-O-Line fluorescent lamp units have been especially designed for end-to-end or side-by-side installations for illuminating large surfaces of inspection and assembly tables as well as long production lines. Each single lamp, unit section reflector is a self-contained fixture, however, suitable for the numerous industrial locations requiring only a single lamp. With each reflector is incorporated a detachable wiring channel that houses auxiliaries

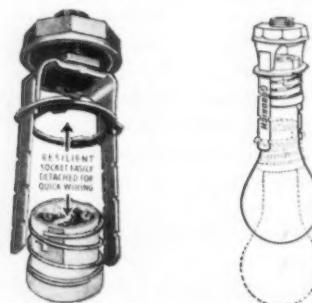


THIS desk fixture utilizes the new Mazda T-8 15-watt daylight fluorescent cool light bulb, giving illumination intensities of 35 to 40 foot-candles. The lamp stands 15½ in. high and the metal shade is 18 in. long, finished in a Georgian bronze. Available for either a.c. or d.c. operation. This is a product of the Mitchell Mfg. Co., 1550 Dayton Street, Chicago.

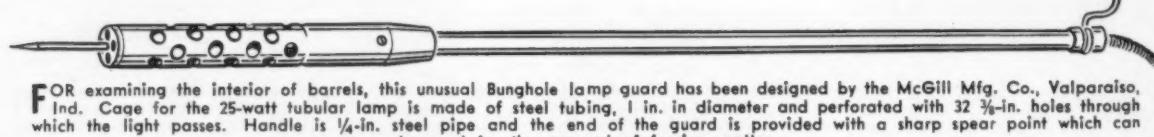
and conceals the wiring. Reflectors are of satin finish, polished Alzak aluminum. End plates are cast alumin-



THE young lady is holding one of the new 40-watt, T-12 fluorescent lamps made by the Hygrade Sylvania Corp., Salem, Mass. Tube is 48 in. long, 1½ in. in diameter and is supplied in daylight and warm white only. Efficiency is 35 lumens per watt.



THIS new adjustable socket, made by the Goodrich Electric Co., 2900 N. Oakley Avenue, Chicago, provides vertical adjustment for adapting new sizes of lamps to existing equipment. Two slotted prongs and a slotted ring which holds a resilient spring suspended socket makes up the assembly. By compressing the prongs, the socket can be shifted to one of four positions so that the filament center can be centered with the reflector. The socket is offered for medium or mogul bases and for keyless or pull-chain. Metal fittings are heavily cadmium plated. Nut is aluminum.



FOR examining the interior of barrels, this unusual Bunghole lamp guard has been designed by the McGill Mfg. Co., Valparaiso, Ind. Cage for the 25-watt tubular lamp is made of steel tubing, 1 in. in diameter and perforated with 32 ¾-in. holes through which the light passes. Handle is ¼-in. steel pipe and the end of the guard is provided with a sharp spear point which can be used for the removal of foreign matter.

num, Flur-O-Line units are available for 18, 24 and 36-in. lamps. They are made by the *Benjamin Electric Mfg. Co.*, Des Plaines, Ill.

THE Miller Co. of Meriden, Conn., has also recently announced a line of fluorescent tube reflector units of both concentrating and flood types. Each type is made in single, double and triple tube reflector models. The single and double tube concentrating types are for spot work application, such as fine assembly work, where the operator must be close to the lamp. The three tube type is for higher intensities where a higher mounting and greater coverage are required. The flood types are used for a wide range of assembly and inspection operations.

Like the Benjamin units, these Ivanhoe reflectors have reflector surfaces of polished Alzak aluminum. At each end of the chromium plated steel outer channel are cast anodized aluminum plates which hold the inner and outer assembly. Operating auxiliary is



BIG BEAM portable storage battery hand lamp will cast a light over a distance of ½ mile and will burn 10 hr. continuously on a single charge of its battery. An auxiliary bulb operated by an independent switch will burn continuously for 60 hr. A specially designed rubber reservoir seals in the battery vents, prevents spillage and collects fumes. The battery may be recharged without taking it from its case. Made by U-C-Lite Mfg. Co., Chicago.

housed in the channel and access is gained by removing the inner reflector. These reflectors are made for 15, 20, 30 and 40-watt fluorescent lamps, the last being the new 48-in. size recently placed on the market.



CARL OHLSON
Vice-president,
Aetna-Standard Engineering Co.



S. M. WECKSTEIN
Chief engineer,
Timken Roller Bearing Co.



T. B. McELRAY
Superintendent,
Carnegie-Illinois Steel Corp.

A. I. S. E. Will Inspect Youngstown Sheet & Tube Mills

YOUNGSTOWN—More than 500 executives and operating engineers of the steel industry are expected to attend a national meeting of the Association of Iron & Steel Engineers here May 2. The meeting, sponsored by the Cleveland and Pittsburgh district sections, will include two inspection trips to Youngstown Sheet & Tube Co.'s new seamless tube mill. The first trip will cover Brier Hill plant where rounds are produced,

while the afternoon trip will take in the new seamless tube mill at the Campbell works.

Following a dinner at 6:00 p.m. at the Ohio Hotel, a technical session will include a paper on "the Development and Latest Design of Seamless Tube Mills" by Carl Ohlson, vice-president, Aetna Standard Engineering Co., and a paper on "Application of Anti-friction Bearings to Tube Mill Equipment," by S. M. Weckstein,

chief engineer, Timken Roller Bearing Co., Canton, Ohio.

T. B. McElray, superintendent, electric light and power department, Carnegie-Illinois Steel Corp., Youngstown, is general chairman of the meeting and will be assisted by Frank W. Lorig, construction engineer, American Steel & Wire Co., Cleveland, and Frank P. May, assistant chief engineer, by-product works, Carnegie-Illinois Steel Corp., Clairton, Pa.

A.S.T.M. Standards Appear in One Book

IMPORTANT modifications are to be made, according to an American Society for Testing Materials announcement, in the methods of publishing standard specifications and tests, to become effective November, 1939. The major change is to combine the Book of Standards (issued triennially) and the Book of Tentative Standards (issued annually). These changes which also embody numerous advantages are necessary because of the great growth of A.S.T.M. standardization work.

All of the 870 A.S.T.M. standards are in widespread use in many branches of industry and commerce. Each is available, and will continue to be in separate pamphlet form and the standards have been issued in triennially published books of standards with an annual volume giving the so-called tentative standards and tests.

The new method of publication will be to issue the standards and tentative standards collectively in one publication, divided into three parts: Part I, Metals; Part II, Non-Metallic Materials—Constructional; and Part III, Non-Metallic Materials—General.

Washer Shipments Heaviest Since 1937

CHICAGO — Household washer shipments in the first quarter of this year reached 392,519 units, the industry's biggest quarter since the third in 1937, according to J. R. Bohnen, executive secretary-treasurer of the American Washer & Ironer Manufacturers' Association.

Household ironers shipped in the three months were 27,831, compared to 30,517 in the opening quarter of 1938, decrease of 8.80 per cent, and a fraction under the shipments of 27,959 in the final quarter of 1938.

We Build America

"I am convinced that the only way to higher standards of living now, as in the past, is in the American pattern of industrial democracy."—Alfred P. Sloan, Jr.

MANY industrial leaders the past week told the nation what they have done and are doing to propel the United States to new industrial frontiers and still higher standards of living.

From 107 companies—including many in the steel producing and metal-working industries—came telegrams listing discoveries of economic and social importance.

These expressions of faith in America as an expanding economy and ever-growing industrial democracy were offered when Alfred P. Sloan, Jr., General Motors Corp. chairman, invited industry to list its accomplishments in connection with G-M's "Highways to New Horizons" dinner given in New York at the dedication of the company's World's Fair building.

For many industrialists the limit of 100 words (collect) set up in Mr. Sloan's own telegraphed invitation to list industry's advances of economic and social importance was not enough. Some business leaders required 400 words. The head of one of the most prosperous steel companies thrifitly required only 57 words to answer Mr. Sloan's request. Some of the answers, in part, came from:

BENJAMIN F. FAIRLESS, president, U. S. Steel Corp.—"In the interest of social and economic progress the steel industry offers the recently developed high strength steels, corrosion resistant and workable cold, making possible the production of light weight moving equipment, buses, trucks, freight cars and the like. This paves the way for the realization of economies in operation amounting to millions of dollars annually."

EUGENE G. GRACE, president, Bethlehem Steel Corp.—"One of the most outstanding developments in the steel industry, to which all of the major sheet producers have contributed, has been the development of high quality deep-drawn steel sheets which have made possible the fender and the all-steel top of the modern automobile. Bethlehem's contribution in this field is Mayari steel, which in addition to having the properties recited above (high corrosion resistance and high tensile strength) is easily workable and safely weldable."

PHILIP D. BLOCK, president, Inland Steel Co.—"After a number of years of research we have found that, by the controlled addition of small quantities of lead, both carbon and alloy steels can be machined 30 to 50 per cent faster. By reducing the cost of machining operations and making possible greater production, such steels have contributed to economic progress."

FRANK PURNELL, president, Youngstown Sheet & Tube Co.—"A recent product of Youngstown research is Yoloy steel, a nickel-copper high tensile steel which meets successfully the requirements of our modern high speed age. It has a tensile strength up to 50 per cent greater than mild steels of the same carbon content; has four to six times greater resistance to corrosion and possesses admirable welding qualities."

CHARLES R. HOOK, president, American Rolling Mill Co.—"Armco's principal contribution to the march of progress in improved standards of living lies in the development of the continuous method of rolling sheet metal and wide strip. The broader market created thereby resulted in greatly increasing the number of men required in the rolling and processing departments of the steel works, and the average hourly and annual earnings of these workers have been substantially increased."

ERNEST T. WEIR, chairman, National Steel Corp.—"We in the steel industry, in the matter of method, have made great improvement in recent years through the development of better continuous rolling processes, which have greatly improved our products, such as, for instance, quality of sheets that allows manufacture of better automobiles, refrigerators, radios, and all the various articles that use this grade of steel."

TOM M. GIRDLER, chairman, Republic Steel Corp.—"So far as our own company is concerned, we have made great advances in strip and sheet production by installing the largest continuous strip mill in the world. We have greatly advanced in the production of tin plate by the cold reduction process; have greatly developed in electro-galvanized wire; stainless steel and electric-weld pipe."

LANGBOURNE M. WILLIAMS, Jr., president, Freeport Sulphur Co.—"Years of research and development work involving the creation of equipment and the refinement of metallurgical processes have had the result that the Cuban-American Manganese Corp. (Freeport Sulphur subsidiary) is in the position today not merely to provide for the American steel industry manganese of suitably high grade at a price comparable with that quoted for foreign supplies, but to demonstrate the probability that engineering science can today make available the vast manganese deposits of this country if future necessities dictate this policy. It is estimated that more than enough manganese ore exists in this country to convert into steel all the known iron ore that the United States possesses."

R. J. AITCHISON, president, Fansteel Metallurgical Corp.—“One of Fansteel’s recent important contributions to industry comprises perfected practical tantalum heating, absorbing, condensing and cooling equipment for those industrial processes which employ hydrochloric and hydrobromic acid and bromine, thus making these difficult to handle reagents available for general industrial use at moderate cost with complete reliability. One application is in connection with production of lead tetraethyl for ethyl gasoline.”

GERARD SWOPE, president, General Electric Co.—“High-pressure, high-temperature steam turbines with hydrogen cooled generators, and also mercury vapor turbines, for greater economy and efficiency in electric power generation. A superior low cost transformer ‘Spirakore,’ an important factor in economic rural electrification. Oilless circuit breakers for electric power circuits. Electronic tubes for the control and more efficient transmission of electric power. The gas insulated X-ray tube which permits more power X-ray equipment in greatly reduced space. The new highly efficient fluorescent lamp, the high intensity mercury lamp and the incandescent projector lamp, which greatly enlarge the field of illumination. Invisible or non-reflecting glass.”

D. J. CAMPBELL, president, Campbell, Wyant & Cannon Foundry Co.—“Our recent contributions to the industry have been in refinements in metallurgical processes for casting crankshafts, camshafts, centrifuse brake drums and sleeves, and new alloyed steels. For control purposes in continuous pouring we have adopted spectrographic methods to replace the slower chemical analyses with gratifying results.”

A. W. ROBERTSON, chairman, Westinghouse Electric & Mfg. Co.—“Certainly one of the major engineering achievements of recent years is the germ-killing Sterilamp developed in the laboratories of the Westinghouse Lamp division. Putting to work the invisible rays of ultra-violet light, the Sterilamp performs such strangely diverse jobs as tenderizing tough cuts of meat, safeguarding the lives of patients undergoing operations and preserving foods. Important to thousands living in the world of today as well as the world of tomorrow is the Westinghouse Precipitron which electrically removes all dust from the air which passes between its charged plates.”

CHESTER H. LEHMAN, vice-chairman, Blaw-Knox Co.—“Trukmixers, a product recently developed by the construction equipment of the Blaw-Knox Co. have, in our opinion, given many more men employment than in the past for the volume of concrete placed. This unit mixes the concrete in transit from a point of central charging to the destination. It being a new industry, many companies throughout the country have installed plants requiring new man power.”

ROBERT C. STANLEY, president, International Nickel Co.—“Nickel’s contribution to the greater convenience of mankind, through improved transportation, communications and industrial products, lies in its participation in the development of modern alloys. With more than 2200 separate nickel-bearing alloys, this contribution is spectacular in the variety and multiplicity of uses which research has found. Among the advances meriting special attention are the development of nickel alloy magnets of long life and great strength.”

E. P. BULLARD, president, the Bullard Co.—“One of the most significant and consistent contributions to the economic welfare of the nation and industrial progress is the constant development in machine tools. It is a latent fac-

tor in the broader progress of all machinery of production. Its contributions are not spectacular or amazing, except to that clan (inoculated with machine oil) who bear responsibility of making more and better goods available at less cost to more people.”

C. D. DALLAS, president, Revere Copper & Brass Co., Inc.—“Most recent achievement is revolutionary line of stainless steel cooking utensils with copper-clad bottoms; trade name is Revere Ware. Utensils combine advantages of stainless steel with respect to resistance to corrosion, long life and appearance with high heat conductivity of copper, providing ideal combination. Design is functional and modern. Development has meant new jobs, new machinery and plant additions.”

FLETCHER W. ROCKWELL, president, National Lead Co.—“Research since 1934 has made titanium dioxide pigment’s highly-concentrated opacity economical and indispensable in many products, such as paper, rubber, ink, leather, cosmetics, plastics, and paint coatings for houses, automobiles and refrigerators.”

ARTHUR V. DAVIS, chairman, Aluminum Co. of America.—“Aluminum is helping to supply more efficient, economical and speedy transportation facilities. The recent trans-Atlantic flight of the American Clipper, the largest commercial passenger-carrying aircraft ever conceived is an example of our progress in this direction. The new train of the Brooklyn-Manhattan Transit Co. is another. Such airplanes and cars embody within and without new aluminum alloys, there combined to form today’s revolution in transportation.”

MARSHALL L. HAVEY, general sales manager, New Jersey Zinc Co.—“So far as a major product development is concerned, we should like to point out that the zinc alloys used in die castings are the result of extensive industrial research. The advantages that zinc alloy die castings present in the manufacture of automobiles—and a host of other products—are contributing in no small way to the economic and social welfare of the American people, a direct result of industrial research.”

H. H. DOEHLER, chairman, Doepler Die Casting Co.—“Our latest major development is in the field of die-casting magnesium, now on a small production basis. Magnesium is the most plentiful metal on earth. It is destined to be the cheapest. Social and economic effect to reduce costs and weight of mechanical appliances, permitting greater distribution, greater production and greater employment.”

ALDUS C. HIGGINS, president, Norton Co.—“One of the most significant recent accomplishments from Norton Co. laboratories is a grinding wheel, the rim or face of which is made of crushed diamonds bonded with metals. The diamond wheel is economically important because it makes possible a wider and more effective use of the cemented carbide cutting tools which are now considered indispensable in lowering machining costs. Another very important Norton development is a water-white resin which for the first time provides a material of this character suitable for optical use.”

H. W. PRENTIS, JR., president, Armstrong Cork Co.—“We mention our conception of and research on materials combining insulating and refractory qualities. Resulting products have made possible use of higher temperatures in metallurgical and oil industries, thus helping to bring to consumer alloy steels, oils and gasoline at more acceptable prices. Same refractory products important in national defense as they provide efficient boiler operation on battleships at great savings in weight.”

Forum



W. E. WHIPP (at left), president, Monarch Machine Tool Co., and president, National Machine Tool Builders' Association, and R. S. Elberty (center), electrical engineer, Landis Tool Co., in conversation with W. D. Turnbull (right), manager Westinghouse machinery electrification division, the forum's host at East Pittsburgh.

o o o

A COMPREHENSIVE program of papers and addresses, the majority contributed by engineers of machine tool companies, featured the fourth annual machine tool electrification forum held by the Westinghouse Electric & Mfg. Co., at East Pittsburgh, April 18-20.

Topics covered at the four formal sessions included use of gearmotors to simplify design; small motors in machine tool applications; cost comparisons between electric and other drives; a study of reversing motor duty; progress in electrification of large machine tools; and the flexibility obtainable by modern electric drives. There was also an address relating to welded fabrication as an aid to electrification of machine tools, another devoted to the styling of special machinery, and one featuring a number of convincing reasons for the use of modern machine tools.

In addition to the formal sessions, the program included equipment demonstrations in various sections of the Westinghouse plant, including a new portable unit for the X-ray inspection of welds; inspection of production models of new controls and a preliminary model of a new planer limit switch; and inspection of the



set-up of a new assembly group in the control manufacturing department.

A visit to the Westinghouse research laboratories on the afternoon of April 20 featured a lecture by Dr. Phillips Thomas, and inspection of some of the more recent developments in research. The annual dinner, with entertainment, concluded the forum.

Registration was at least equal to that of the 1938 forum. It included

o o o

AT LEFT

C. B. STAINBACK, Westinghouse industrial sales manager, making the welcoming address which opened this year's electrification forum.

BELLOW

OPPORTUNITY was afforded between sessions for informal discussion of mutual problems. In this group (from left to right) are: W. S. Gleeson, engineer, and Herbert Rosengren, design consultant, American Machine & Foundry Co.; R. S. Kersh, Westinghouse machinery electrification engineer and chairman of the forum committee, and T. Jensen, design engineer, American Machine & Foundry Co.



Reflects Progress in Machine Tool Electrification

about 60 representatives of some 37 machine tool building companies, 15 representatives of six machine tool dealers, and 12 representatives of builders of other machinery and of users of machine tools.

The National Machine Tool Builders' Association was represented by

lems indicates, he said, that there is need for study on the part of the machine tool builder of the possibilities of better methods of wiring-up machine tools, better selection and better application of motor and control, and a better understanding of the materials that the electrical manufac-

has accepted it rather as a basis of his designing and manufacturing methods. But this demand for greater accuracy and finer finish, for more rapid production, and for more complex machine tools of necessity is reflected in his demands on electrical manufacturers.



THIRD formal session of the fourth Westinghouse machine tool electrification forum, held at East Pittsburgh April 18-20.

• • •

its president, W. E. Whipp, president, Monarch Machine Tool Co., and by its general manager, Tell Berna, both of whom were speakers at the forum.

Machine Tool Demands More Exacting

Mr. Whipp, in his address, remarked that the machine tool builder comes to these forums in the dual capacity of customer and salesman. In regard to the second part of that relationship he pointed out that the Westinghouse company has not only bought machine tools as every other metalworking concern buys them, but has for a period of years deliberately embarked on a long term program of replacing obsolete machine tools with modern tools.

It is only recently that the National Machine Tool Builders Association has found it possible to undertake a study of electrical problems that confront the machine tool builder. The preliminary report of that association's Committee on Electrical Prob-

turer already has to offer his machine-tool customers.

"At the same time, the electrical manufacturer will realize that our customers are coming to us with more and more exacting demands," he continued. "A few years ago we worked to a thousandth of an inch; now we are dealing with 'tenths' or even micro-inches. Finish that would have been entirely satisfactory 15 or 20 years ago is not acceptable today. Work that once was turned and then ground is now finished on the lathe, and operations that were carried out on three or four successive machine tools are now combined on one machine and done at one setting."

The machine tool builder is not resisting this tendency, he said; he

Some of the activities of the Committee on Electrical Problems of the National Machine Tool Builders' Association were outlined by Mr. Berna at the same session.

Last year the Westinghouse company spent approximately \$5,000,000 on new machine tools and manufacturing equipment, and so far this year some \$2,000,000, according to J. R. Weaver, the company's director of equipment, inspection and test and president, American Society of Tool Engineers, who spoke on "Why Not Buy New Machine Tools?" Reasons why new machine tools should be installed in manufacturing industries were said to include the creation of new products and redesign of existing products, the shortening of the work week, and increased labor rates.

"The machine tool has been blamed for creating unemployment," said Mr. Weaver, in another part. "The thought

(CONTINUED ON PAGE 83)

THIS WEEK ON THE ASSEMBLY LINE

By W. F. SHERMAN
Detroit Editor

... Crosley midget car, to be unveiled Friday at Indianapolis, regarded as guinea pig . . . Studies continue on rust-resistant material for automobile mufflers . . . Better fuels in 1940 presage change in carburetor system and fuel pump . . . Fill-in steel buying offers more support to steel industry in past week.

DETROIT—This week at Indianapolis Speedway, Powell Crosley, of radio manufacturing fame, will unveil the new Crosley car, a midget that will give 40 to 50 miles per gallon of gasoline. Whether or not the majority of automotive men are willing to concede possibility of success for this new car, it remains true that the Crosley will serve the industry as a sort of guinea pig. It will provide the answer to whether Americans are willing to buy such a

vehicle in enough numbers to keep a manufacturer in business.

America passed through the "cycle car" period 25 to 30 years ago, and then every bicycle shop made an attempt to get into the business. These many cycle cars were responsible for building up the list of 1500 automobile name plates which have passed in review. In fact, probably many of the companies rose and fell so fast that the names never got on record.

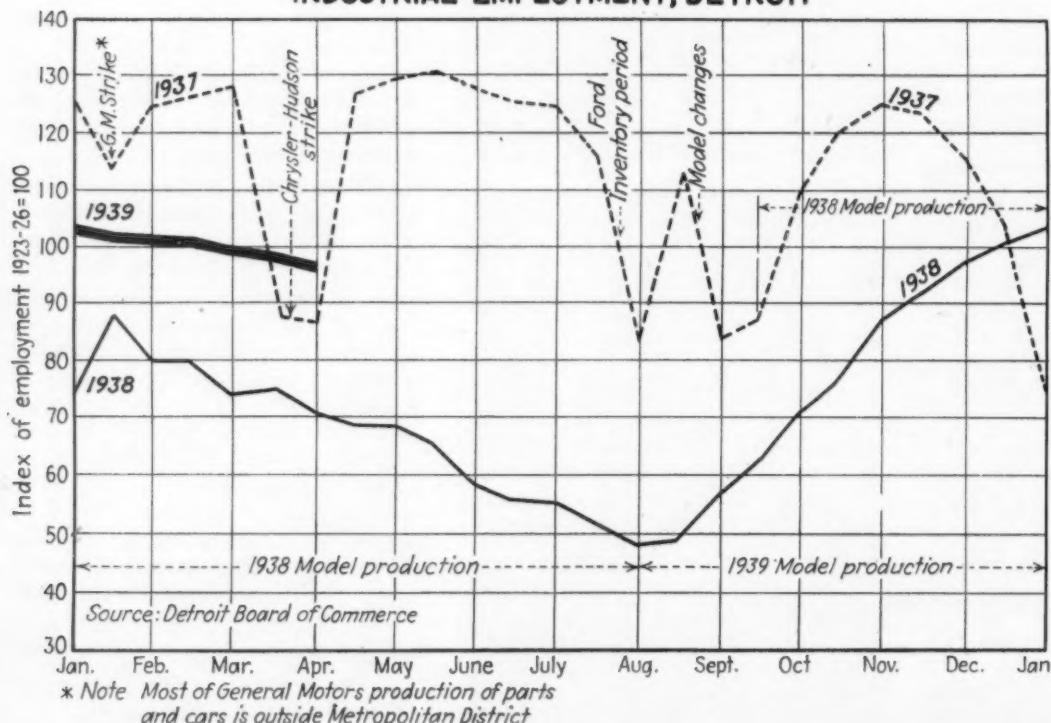
In recent years, and perhaps at an

unfortunate part of the economic cycle, Austin attempted to introduce something of the sort. Today the lightest car being sold in any volume at all is Willys, which has reorganized and is making a strong comeback into the weight class just below the Big Three.

The new Crosley is between the Austin and Willys in wheelbase and, as reported here before, has a two-cylinder, horizontally-opposed engine of 20-25 hp.

Starter, battery and similar accessories on the Crosley are full auto-size units and the "running gear," front and rear axles, are exceptionally substantial units for such a small vehicle. The engine, manufactured by Waukesha Motors, at Waukesha, Wis., is mounted conventionally in front. Type of transmission is indicated by the manufacturer's name—Warner Gear. Indicating anticipated volume, it has been learned in the last week

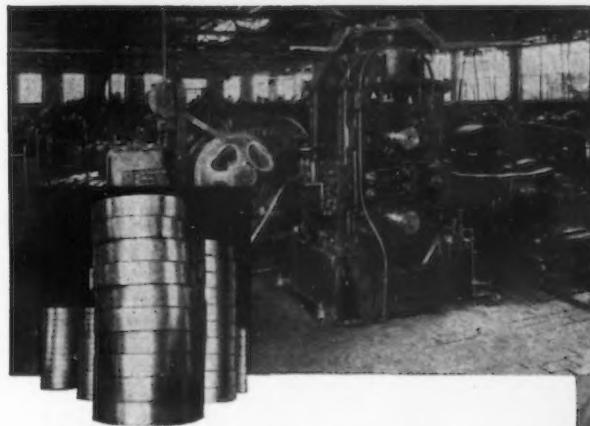
INDUSTRIAL EMPLOYMENT, DETROIT



Industrial employment index for Detroit declined to 96.3 on April 15.

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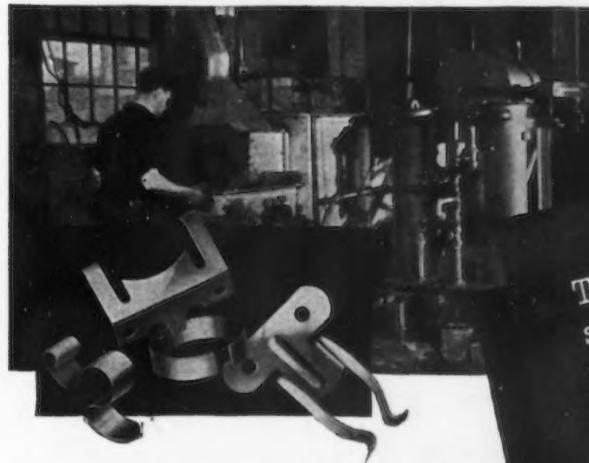


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that the Murray Corp.'s order for bodies and frames calls for 37,000 units to be manufactured in the next two or three months. Assembly work is expected to be done in Indiana, probably at Richmond.

Automobile production totals grew last week, under the somewhat intermittent sunshine, and output not only regained its previous position but, by a slight margin, set a record for the calendar year so far. The total output, according to Ward's Automotive Reports, was 90,280, which compared with 88,050 units the previous week, and 57,363 in the corresponding period a year ago. The previous high for this year was 90,205 units in the week of Jan. 15.

The week saw the re-establishment of five-day schedules at two major plants, Dodge and Plymouth, which boosted the Chrysler total for the week to 23,625 cars and trucks, compared with 20,725 the previous week. General Motors plants assembled 34,405, a slight loss from the previous week's 34,533. Ford, Mercury and Zephyr volume totaled 21,480, against 22,230 the previous week. This meant 21,000 Ford and Mercury assemblies, com-

pared with 21,750 for each of the preceding four weeks. Chevrolet output was unchanged at 21,500. In the Chrysler group, Plymouth alone accounted for 2000 of the gain, assembling 11,700 cars in all.

It is apparent from this that there is no general upward trend, despite the Chrysler gains. Seasonal expectations are not being met, but, nevertheless, volume is so far ahead of 1938 that executives see no reason for becoming pessimistic.

Still Seek a Muffler Metal

A coated metal which once found its biggest market as a lining for rust resistant household ovens today holds forth to the automotive industry one of its bright hopes for a corrosion-resistant automobile muffler.

Last fall the "Assembly Line" reported that studies of steel and other materials were being conducted in automotive laboratories to find some way of whipping the problem of "burnt-out" mufflers. This problem has become really severe because modern mufflers, which are highly baffled to keep down the noise level in present-day automobiles, frequently transmit

exhaust gases which are cooled enough to permit condensation. The trouble is accentuated in some cases because mufflers are placed at the rear of the car, giving the gases extra time to cool. The condensate includes water, sulphurous acid and sulphuric acid. Corrosive possibilities are increased when "leaded" fuels are used; the products of combustion then include hydrobromic acid.

Many materials have been offered as substitutes for the black sheet steel generally used. Despite its cost, even a copper muffler has undergone tests. Some of the most interesting results being obtained now involve the use of a steel sheet coated with an alloy of which aluminum is an important element. For 15 to 20 years, before the days of vitreous enamel lined ovens, this material was used to resist rust and corrosion in household ovens. Since then, the material has been used largely by utilities for rust resistant pipe and fittings.

This sheet is prepared by a hot dipping process involving the operation by coating of an alloy composition at high temperatures, that is, between 1100 and 1200 deg. It is nothing new. It has been manufactured for over 40 years, and the coating has frequently been referred to as "fused aluminum." Actually the coating is said to consist of some four or five alloyed metals.

From kitchen to garage may be the course of this material if final results of current tests meet every expectation. Samples have hung for months in an exhaust chamber of an automotive laboratory which handles the fumes from many test engines under very humid conditions. In addition, a fleet of test cars with mufflers made of this material have been in operation since last fall under conditions which ordinarily might have been expected to cause failure before this time.

One of the difficulties which metal producers have in satisfying the automotive demand for a proper material is that most modern mufflers are made of sheets as light as 22 to 27 gage. The 27 gage material, wrapped around two or three times, is not at all uncommon. Because corrosion prevention is such a problem, one metallurgist asserts that probably the ultimate solution must be 18-8 stainless. Of course, automobile companies must watch cost with an eagle eye even on such a part as this. Mufflers, shells, baffling and inner tubes require more material than might at first be estimated by an outsider. For instance, a muffler for

THE BULL OF THE WOODS

BY J. R. WILLIAMS



one of the popular cars is 20 in. long and weighs 10 lb.

Other developments in the petroleum industry may partly, or completely, eliminate the corrosion difficulty in the near future anyhow. New and better fuels are among the most certain of the changes impending in the automobile industry. And one of the greatest possibilities is that in 1940 high octane fuels without tetraethyl lead will be put on the market as a result of Sun Oil Co.'s development of the Houdry process which produces 80 octane fuel from crude. This would eliminate one of the corrosive gases, the hydrobromic acid.

More than the muffler problem will be solved when such fuels become available. The auto industry will undoubtedly go through another transition stage like that when "high compression" engines and ethylized fuels were introduced a few years ago. Here again the industry is up against a problem almost like the one about "which came first, the chicken or the egg." Higher compression engines, with greater efficiency and fuel economy, wait for the better fuel—and the higher rated fuel does not find a big market until higher compression engines are on the road.

One of next year's developments in the Ford car will be the reduction of engine weight by more than 40 lb. Ford engineers have hammered away at this subject for several years and last year were on the verge of authorizing changes which would have reduced the V-8 engine weight considerably.

Plymouth and Dodge, which have not had really major power plant changes for several years, will have more powerful engines in 1940.

Most 1940 cars will appear with major changes in front end appearance. Look for virtual disappearance of the "valley" between fender and hood on many of the new models. Last week one of the General Motors hood stampings was viewed for the first time. From the front end, the top lines of the hood and fenders are almost the same level. Between is only a slight dip, a sort of "gull-wing" effect.

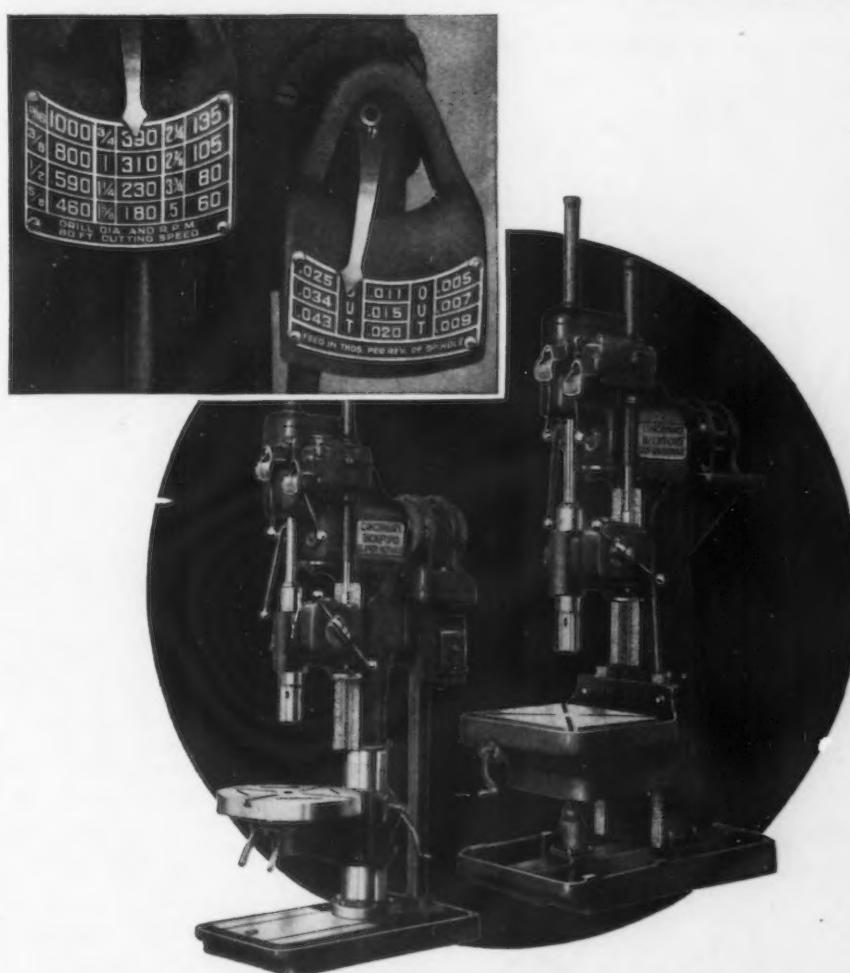
Steel Buying Improves Slightly

There has been a moderate upturn in the amount of steel purchased by automobile companies in the past week. This material is still being purchased strictly for fill-in requirements but has come out in enough volume to make the sales records for several of the steel company offices look considerably better than they have for months.

Assembly Line Notes

Removal of the Continental Motors Corp. Detroit operations to Muskegon was announced last week by W. R. Angell, president, to be completed within the next 60 days. This move was predicted in the Assembly line. * * * Two more Chrysler Corp. men have been added to the Willys-Overland staff at Toledo. Chester C. Codding, who started 15 years ago with the Maxwell company as superintendent of planning in the body plant, resigns his position as assistant to

Byron Foy, president of De Soto, to become assistant to the president and general manager of Willys, who is J. W. Frazer, formerly of Chrysler. A. F. Jenkins, of Winnipeg, former Dominion general sales manager of Chrysler, has become sales manager of Willys Export Corp. of Canada. * * * Detroit's index of industrial employment on April 15 had dropped to 96.3, representing 347,000 employees, compared with 97.7, or 352,000, on March 31, and 68.8, or 247,000 workers, on April 15, 1938.



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THIS WEEK IN WASHINGTON

... Laughter of NLRB aides at questions of Senate-House Committee on Labor may speed drive for Wagner Act revision . . . Government steel buying increases . . . Domestic manganese industry held costly.

By L. W. MOFFETT

Washington Editor, *The Iron Age*

WASHINGTON — With both sides tightening their lines of battle, in the struggle for and against amending the National Labor Relations Act, the outcome now is held to rest principally on two elements. One is the matter of time. The other is the type of testimony in support of overhauling the law. If Congress delays adjournment long enough and if demand for amendment is forcefully made, with supporting facts, before the Senate and House Committees on Labor, it is the belief that substantial changes may be enacted. Otherwise it is the opinion that amendment, if any, will be slight.

There are strong forces on each side. On one, in opposition to amendment are the Administration and the CIO. On the other are large industrial groups and the AFL. Slight distinction may be made in the attitude of the Administration and the CIO. The former, as represented by the National Labor Relations Board, has with its fingers crossed, indicated it would not actively oppose certain minor amendments, set forth in *THE IRON AGE* of April 20, page 54. At the same time it emphasized through Chairman J. Warren Madden in two-day testimony last week before the Senate committee that it is unconvinced that the act requires amendment at the present time. Fearing that any tinkering with the act would throw it open to broad amendment, the CIO wants it left entirely intact.

Business groups and the AFL, how-

ever, are demanding wide changes, though by no means identical changes in both branches of Congress, stronger in the House than in the Senate. There is no doubt that when its time comes the AFL will vigorously press its demands. While industrial groups also will present their case, complaint is made that some who are highly critical of the act, as well as its administration, are reluctant to testify, fearing reprisal at the hands of the New Deal. Nevertheless there will be a large array of industrial witnesses to place their views before the Congressional committees. Their testimony, together with that of the AFL, may compel important revision of the act provided the fight reaches the floors of Congress and is not cut short by adjournment. But there is considerable opinion just at present that changes, if made, will not go beyond three, listed as follows:

(1) Right of employers to petition for elections. While contention is made that the NLRB could now grant that right, demand is being made that it be specifically written into the law. The NLRB has indicated it would not oppose such an amendment.

(2) Adequate recognition of craft unions. This demand, which could be subjected to wide interpretation, probably would be conceded by the board as a sop to AFL.

(3) Prohibition of coercion "from whatever source." Industry's demand for this amendment has strong sup-

port in Congress but is opposed by the board. Chances for its adoption are smaller than those for either of the first or second.

May Investigate NLRB

Another view is that there will be no legislation and the House, near the end of the session, will pass a resolution setting up an independent committee—that is one made up of non-members of the labor committee—to investigate the NLRB during the summer recess. Such a resolution temporarily held up by the House Rules Committee, would be similar to that introduced by Representative Anderson of Missouri calling for inquiry into charges of NLRB-CIO bias and prejudice against employers. These charges are partly inspired by groups who insist that while changes in the act are desirable they are less important than its so-called maladministration by the present board.

Hearings before the Senate committee last week during testimony of Mr. Madden, however, developed personal incidents, which though seemingly minor, might well develop growing support of the committee toward employer demand for a shake-up in administration of the act, if not broad amendments. Mr. Madden, who, from the board standpoint on the whole made an able defense of the act, was unfortunate in being surrounded by a sizable and heterogeneous group from the board personnel. Zealously committed to the act as it stands and its administration these payrollees had no difficulty in knocking off from their supposedly arduous duties to sit in on the hearings and register their impressions as Mr. Madden was closely questioned.

NLRB Employees Laugh

At times they met questions with derisive laughter, which plainly aroused the displeasure of members of the committee. To them it indicated there is foundation for charges of intolerance and prejudice in the administration of the law by its present organization.

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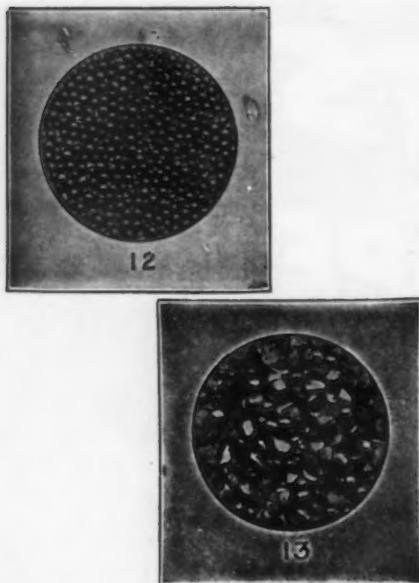
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of 119 pages, Mr. Madden, by far the ablest member of the board, stoutly defended the act. Assuming a moderate but firm tone, he assigned many merits to it. He said that in spite of "initial" difficulties he believed it "has functioned remarkably well." It has, Mr. Madden said, reduced industrial strife; made possible freedom in self-organization for millions of employees; laid a sound basis for "decent and dignified labor relations." For these reasons, he expressed the belief that "except upon the plainest showing of need for change, the act should be retained in its present form."

Less measured in expression when replying to questions, Mr. Madden probably unconsciously confirmed impression of narrow administration of the act and prejudice against employers. Indicative of this attitude was his statement, under questioning by Senators Holt, Taft and Ellender and Davis, that "under certain circumstances an employer who called a union leader a Communist might be charged with coercion even if the allegation were true." The reasoning on which Madden based his opinion was that the allegation might have a coercive effect by making clear that the employer did not wish the worker to join a particular union.

Opposes Right to Talk

Mr. Madden made this contention in opposing a proposed AFL amendment which would give employers the right to talk to their workers. Mr. Madden said that if the allegation were made against a leader of a long-established union, on which organization the remark would be without effect, the charge of coercion would not hold.

"Then that means you can call an AFL union anything but not so the CIO union?" inquired Senator Taft.

"If that is so, it is because the facts of the living world are so and not anything the board has done," replied Mr. Madden who had previously conceded that employers prefer the AFL to the CIO.

To the claim that alleging a union leader is a Communist would be coercive "under certain circumstances" even if the charge were true, Senator Ellender commented that "The truth ought to be a defense." And Senator Taft said "it seems to me an utterly foolish and unsound method of interpreting a law of Congress."

Claims Board Unbiased

Regarding AFL charges of CIO bias Mr. Madden said board agents succeeded in settling practically the same percentage of AFL cases as CIO

cases, 53.5 per cent as against 53.8 per cent. Concerning cases dismissed or withdrawn, Madden stated that here again the percentages are almost exactly the same, 37.3 per cent as compared with 37 per cent.

Answering charges that election procedure of the board particularly has been operated to the disadvantage of the AFL, Mr. Madden said that the average time in AFL cases has been from 105 to 113 days as against 126 to 130 days in CIO cases. He stated that in cases requiring elections, the average time in AFL cases has been 202 to 212 days as against 235 to 239 days in CIO cases.

Mr. Madden said that he supposed that the fact that CIO cases frequently involve a greater number of employees than do AFL cases, and are likely to be lengthier and more complex, accounts for the somewhat speedier disposition of AFL cases.

\$488,955,589 of Farm Equipment Made in '38

WASHINGTON — Reflecting a decrease of 15.7 per cent, the value of farm equipment and related products manufactured in 1938 was \$488,955,589, compared with \$580,048,914 for 1937, according to the Bureau of the Census. In 1936, the value was \$487,273,428. The production 1938 and 1937 values for the more important classes of farm equipment follow:

	1938	1937
Tractors	\$196,217,993	\$268,394,076
Harvesting machinery	71,522,394	46,602,012
Plows and listers	26,743,664	33,042,165

U. S. Sees 590,000 New Houses Yearly until 1944

WASHINGTON—The Commerce Department estimated last week that, based on anticipated population increases, the annual construction of 590,000 dwelling houses during the next five years can be expected. The survey, prepared for the National Resources Committee by the Bureau of Foreign and Domestic Commerce, said that private expenditures for new residential construction in 1938 were valued at \$1,285,000,000 as compared with \$1,393,000,000 in 1937. In the peak construction year of 1926, total money spent for residential building rose to \$4,591,000,000, the report said, while the low point was reached in 1934 when expenditures dropped to \$271,000,000.



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Revised Specifications for Cars Issued by Rail Association

WASHINGTON — Passenger cars that will afford maximum protection under all conditions of service and can be used with cars of all types of construction now in operation are proposed in revised specifications that have been sent out to member roads of the Association of American Railroads. The specifications were prepared by the association's mechanical division's Special Engineering Committee and approved by the General Committee of the Mechanical Division with recommendation for adoption by the railroads.

In a letter accompanying the revised specifications, President J. J. Pelley of the association points out to the railroads that a Special Engineering Committee of the Mechanical Division was appointed on Jan. 9, 1939, to co-operate with car builders and materials manufacturers in preparing a set of minimum specifications to cover future construction of new passenger cars. The requirements laid down will not be retroactive into equipment now in service which has been built to former accepted specifications.

Specifications Approved

The new specifications were prepared and prescribed to the association's board on Feb. 24 which had the mechanical division submit them to member carriers for comment and suggestions. On March 31 the board at a meeting in Washington approved the specifications.

In the section pertaining to their application it is pointed out that the specifications shall cover all new passenger equipment cars to operate in trains of over 600,000 lb. light weight.

Among the specifications are the following:

All strength members of cars shall be of all-metal construction.

Where steel is specified, other approved materials producing equivalent strength of design may be used.

Castings may be used as parts of the strength members. Such castings having a carbon content of .25 per cent and over must be annealed.

Where built-up welded metal parts are substituted in place of castings the unit is to be stress relieved before application.

Any structural material in which the yield strength exceeds 80 per cent

of the tensile strength shall not be used.

The car body shall be designed to carry its own dead weight in addition to the maximum specified live load under service conditions.

Built-Up or Cast Frames

Trucks may have either built-up metal or cast frames and may be either four or six-wheel type. All truck details and requirements shall be in accordance with the practice of the Association of American Railroads and the railroad for whose service the cars are built.

The trucks shall be locked to car body. Strength of locking means shall be not less than the equivalent of an ultimate shear value of 250,000 lb. and so arranged that the entire truck will lift with the car body without disengaging the center plates. The details of the attachments shall be such as to develop the full tensile strength of the connection.

Orders For U. S. Seen in Holland; Reich Too Busy

WASHINGTON — The possibility of increasing United States exports to the Netherlands, including exports of industrial machinery, was reported last week as a result of political developments in Germany, the impaired quality of certain German exports because of raw material shortage, and the fact that many German factories are booked with orders for the Reich for many months ahead. Jesse F. Van Wickel, Commercial Attaché at The Hague, reported to the Commerce Department that in recent years instances have occurred where delivery dates are as long as 18 months for certain heavy industrial machinery manufactured in Germany.

NLRB Rules Against Kansas City Company

CHICAGO—A Labor Board ruling last week ordered the Kansas City Structural Steel Co. to disestablish as a bargaining agent the Employee Association, and to cease discouraging membership in labor unions. The board held that the independent association was company dominated.

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Government Steel Buying Increases

WASHINGTON — Government awards under the Walsh-Healey Act for iron and steel products during the week ended April 15 totaled \$1,075,035.81, while machinery awards aggregated \$2,753,895.32. Details of these and related awards follow:

Iron and Steel Products

Crucible Steel Co. of America, New York, rudder stock and bearing trunks	\$11,061.82
Walter Kidde & Co., Inc., New York, steel cylinders	25,263.00
American Locomotive Co., Schenectady, N. Y., forgings	26,087.00
The Kinear Mfg. Co., Columbus, Ohio, steel rolling doors	19,858.00
Western Pipe & Steel Co. of California, San Francisco, steel pipe lines	28,965.00
Bethlehem Steel Co., Bethlehem, Pa., steel, bar	13,465.09
Colorado Fuel & Iron Corp., Denver, steel reinforcing bars	11,649.00
The West Virginia Rail Co., Huntington, W. Va., reinforcing steel	60,116.18
Carnegie-Illinois Steel Corp., Washington, steel, angles, bars	17,798.73
The Youngstown Sheet & Tube Co., Youngstown, steel, sheet	11,873.12
Carnegie-Illinois Steel Corp., Washington, shapes, steel	16,350.00
Edge Moor Iron Works, Inc., Edge Moor, Del., boiler, stoker, fan	73,722.00
Edge Moor Iron Works, Inc., Edge Moor, Del., boiler and access	102,800.00
Industrial Piping & Engineering Co., Baltimore, boilers, fans	242,395.00
C. C. Moore & Co., Engineers, San Francisco, boiler	169,023.00
Fassler Iron Works, Inc., New York City, fabricated steel	14,040.00
Republic Steel Corp., Culvert Division, Canton, Ohio, sectional plate arch	45,622.40
Crucible Steel Co., New York City, nickel steel	17,055.15
American Factors, Ltd., Honolulu, T. H., structural steel	22,208.82
Widin Metal Goods Co., Garwood, N. J., mast section	9,922.50
Chicago Bridge & Iron Co., Philadelphia, fuel oil storage tanks	135,760.00
Joseph T. Ryerson & Son, Inc., Cincinnati, steel products	Indefinite

Non-Ferrous Metals and Alloys

Aluminum Co. of America, Washington, D. C., forgings, aluminum alloy	\$12,740.60
Aluminum Co. of America, Washington, D. C., aluminum alloy	12,932.30

Other Machinery

General Machinery Corp. (Hooven, Owens, Rentschler Div.), Hamilton, Ohio, air compressor	\$43,515.00
Nordberg Mfg. Co., Milwaukee, air compressor	46,875.00
The Cooper-Bessemer Corp., Mt. Vernon, Ohio, air compressors	68,478.00
Worthington Pump & Machinery Corp., Washington, turbo-alternator	67,605.00
Elliott Co., Jeannette, Pa., turbo-alternator	123,050.00
Elliott Co., Jeannette, Pa., turbo-alternator	70,510.00
Elliott Co., Jeannette, Pa., turbo-alternator	123,125.00
Elliott Co., Jeannette, Pa., turbo-alternator	117,950.00
Ingersoll-Rand Co., Washington, steam turbine	39,750.00
Westinghouse Electric & Mfg. Co., Washington, turbo-alternators	374,560.00
Brown & Sharpe Mfg. Co., Providence, R. I., milling machines	10,994.52
Wm. Sellers & Co., Inc., Philadelphia, machine, boring, milling	49,790.00
H. R. Krueger & Co., Detroit, mach., turning, facing	19,360.00
H. R. Krueger & Co., Detroit, mach., drilling, reaming	19,600.00
Cory and Joslin, Inc., San Francisco, pumping plant	153,000.00
Caterpillar Tractor Co., Peoria, Ill., tractors, trailer builder, graders	19,471.00
Silent Hoist Winch & Crane Co., Brooklyn, capstans	25,690.00

Victor R. Browning & Co., Inc., Willoughby, Ohio, crane	77,150.00
Orton Crane & Shovel Co., Chicago, locomotive cranes	178,410.00
R. W. Kaltenbach Corp., Bedford, Ohio, dry dock cranes	324,750.00
Star Iron & Steel Co., Tacoma, Wash., dry dock crane	154,700.00
The Morgan Engineering Co., Alliance, Ohio, gantry crane	119,700.00
Condenser Service & Engineering Co., Inc., Hoboken, N. J., condenser and access	10,560.00
Condenser Service & Engineering Co., Inc., Hoboken, N. J., condenser and access	11,040.00
C. H. Wheeler Mfg. Co., Philadelphia, condensing equipment	18,575.00
Honolulu Iron Works Co., Honolulu, T. H., laundry equipment	33,340.00
Winslow Marine Railway & Shipbuilding Co., Seattle, Wash., caissons	389,650.00
Montgomery Elevator Co., Moline, Ill., freight elevator	10,160.00
C. H. Wheeler Mfg. Co., Philadelphia, condensers and equipment	40,725.00
Crane Co., Long Island City, N. Y., steel valves	11,811.00

Japan's Machine Imports From U. S. at New High

WASHINGTON—Japanese imports of metal working machinery from the United States during 1938 reached a record value of \$23,811,408 and, with the trade continuing at the rate of \$2,285,000 a month, the 1939 purchases are expected to be greater.

The Commerce Department's Machinery Division estimates that Japanese imports of metal working machinery from principal producing countries—the United States, United Kingdom, Germany, and Switzerland—were valued at \$35,540,986 during 1938, an increase of 104 per cent over the 1937 figure. Although the United States was the principal source of 1938 imports, back in 1934 Germany was the major supplier to the Japanese market. Imports from the United States in that year were valued at \$3,025,578 and accounted for only 43.7 per cent of the total trade compared with 67 per cent in 1938.

German exports of metal working machinery to Japan in 1938 were valued at \$9,437,737 compared with \$7,788,825 in 1937.

Carry Dues Cards, SWOC Tells Workers At Gary

CHICAGO—In conjunction with its current membership drive, scheduled to close May 1, the Gary lodge of the SWOC has started holding three meetings daily in its Gary headquarters for all steel workers. Last week in the Gary Post-Tribune, the union published an advertisement suggesting that members carry their dues paid cards to and from work until further notice.

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a thoroughly developed innovation by one of the oldest and best-known builders of Forging Machinery

☆ Operate without boards by means of rigid steel rod taper-fitted in ram and rolls faced with durable friction material.

☆ Variable stroke controlled by distance treadle is depressed — light fast blows for fullering — intermediate blows — accelerated heavy blows struck harder and faster than any gravity hammer.

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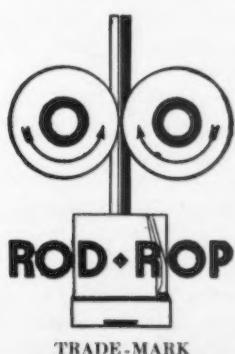
☆ Convenient calibrated wedge guide adjustment with columns rigidly fixed to base guarantees perfect die match.

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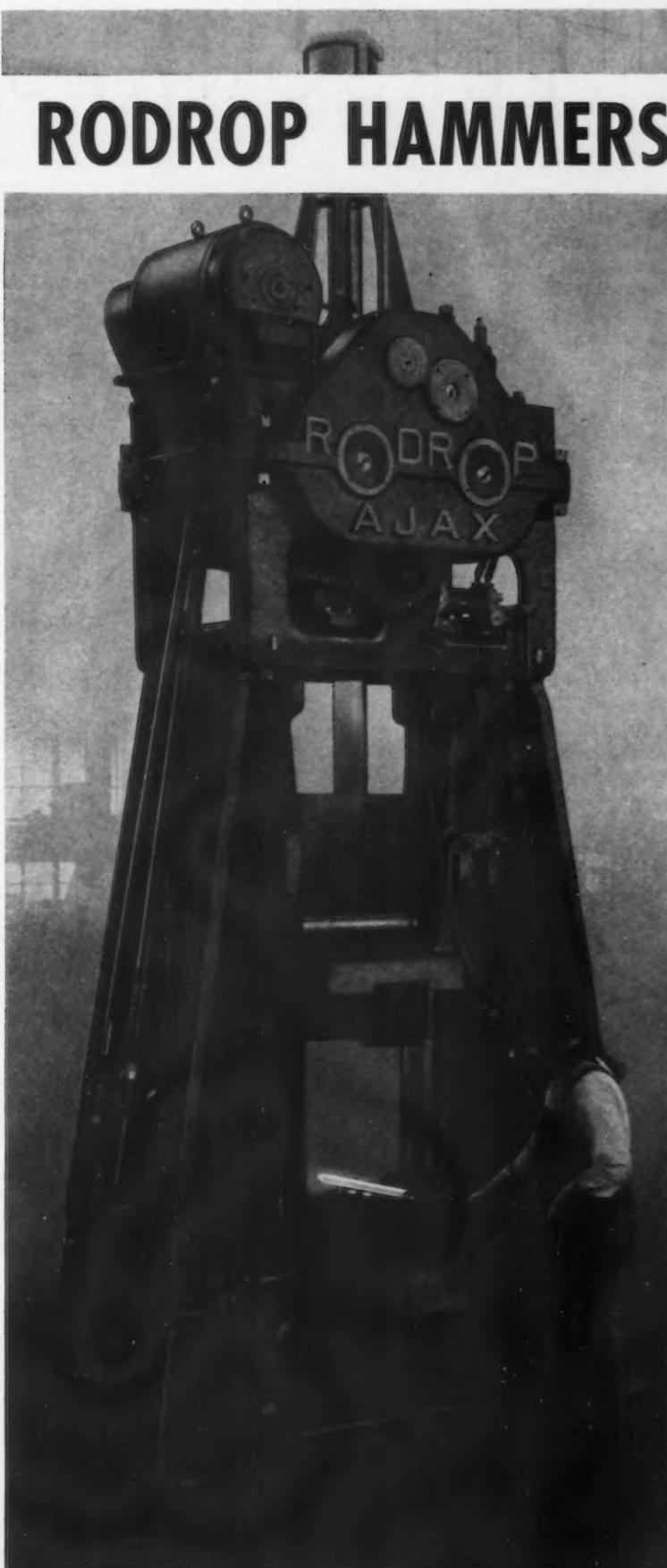
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PERSONALS . . .

F. G. SCHRANZ, who has been engaged in the engineering and sales of hydraulic and special machinery for 34 years, has been appointed general manager of the Baldwin-Southwark Corp., Philadelphia. After receiving technical training as mechanical and electrical engineer in Vienna, Mr. Schranz came to this country and started, in 1904, as a machinist with the Midvale Co. The following year he became designing engineer at the Camden plant of R. D. Wood & Co. In 1915 he became associated with the Southwark Foundry & Machine Co. and later served as vice-president in charge of sales and engineering. When the latter company became the Southwark division of Baldwin Locomotive Works in 1929, Mr. Schranz was made sales manager and manager of that division.

* * *

ALEXANDER E. WALKER, who was recently appointed vice-president and director of the National Supply Co., Pittsburgh, has been elected president of Spang, Chalfant, Inc., Pittsburgh.

* * *

C. N. KIRKPATRICK has been appointed vice-president of the Landis Machine Co., Waynesboro, Pa. He will continue as secretary of the company.

* * *

MARVIN A. HEIDT, personnel director of the Edward G. Budd Mfg. Co. and the Budd Wheel Co., Detroit, for 13 years, will become director of industrial relations for the Bendix Products & Aviation Corp., South Bend, Ind. He will assume his new duties May 1. Mr. Heidt joined the Budd company after eight years with the Dodge division of Chrysler Corp. Friends in Detroit honored him at a banquet before he left for South Bend.

* * *

H. C. WILLIAMS has been appointed general plant superintendent of the H. K. Porter Co., Pittsburgh. He formerly was associated with the Patterson Foundry & Machine Co., East Liverpool, Ohio, and the H. H. Robertson and Blaw-Knox companies of Pittsburgh.

* * *

KENNETH C. ELLSWORTH has been appointed manager of the Link-Belt Co.'s Eastern stoker division with headquarters at Philadelphia.

* * *

A. W. F. GREEN has resigned from the staff of Allegheny Ludlum Steel Corp., Pittsburgh, to become research metallurgist at the Pratt & Whitney Aircraft Division of United Aircraft Corp., East Hartford, Conn.

* * *

PETER J. MULLER has been appointed group leader in charge of cost study in the industrial engineering department of Gary Works, Carnegie-Illinois Steel Corp. Mr. Muller goes to Gary from the corporation's South Chicago works where he began as a water boy in 1917. After serving in various capacities in the blast furnace department until 1937, he was made a junior industrial engineer. A year later he was appointed to the post of industrial engineer, the position he held until the present time.

* * *

RALPH K. SUPER has joined the engineering staff of Timken-Detroit Axle Co. as a specialist in brake design. Mr. Super had been chief engineer of Lenderman Devices, Inc., since 1936. He was previously associated with Mack Truck and General Motors in engineering research capacities.

* * *

DONALD J. SUBLLETTE, secretary of the Detroit chapter of the Society for the Advancement of Management and principal examiner for the Detroit Civil Service Commission, has been appointed to a newly-organized Police Merit Board for the city.

* * *

ALFRED MARCHEV, works manager and chief engineer of the Signode Steel Strapping Co., Chicago, has been elected a director of the company, succeeding H. C. PORTER.

* * *

Roy A. HORNING has been appointed assistant general manager of the glass and closure division, Armstrong Cork Co., with headquarters at Lancaster. He formerly was general superintendent of the Pittsburgh plant and succeeds DWIGHT L. ARMSTRONG, who assumes administration of the company's general affairs.

* * *

A. D. SHEERE, heretofore assistant division manager of the Pittsburgh division of the A. M. Byers Co., Pittsburgh, with offices in Atlanta, has been

appointed manager of the Houston division office. W. B. SIMPSON, formerly sales representative in the Pittsburgh division's northern territory, succeeds Mr. Sheere in Atlanta.

* * *

G. M. BOWEN has become acting president of Ross Operating Valve Co., Detroit, following the death on April 11 of C. A. Ross, founder and president.

* * *

JOSEPH A. MARTZ has resigned as account executive of the Buchen Co., Chicago, where he was in charge of the account of the Inland Steel Co. Mr. Martz is now engaged in customer relations and research work for the Studebaker Corp., South Bend, Ind.

* * *

JUAN BENETA, of the federal irrigation department in Mexico, recently visited American industries manufacturing machinery and equipment. He spent three days at the factory of the Murphy-Diesel Co., Milwaukee, and also visited the plant of the Bucyrus-Erie Co., South Milwaukee, and that of the Northwest Engineering Co. at Green Bay, Wis., later inspecting plants of the International Harvester Co. and the Caterpillar Tractor Co. in connection with proposed purchase of excavators, tractors and other machinery for Mexican government projects.

* * *

THOMAS ADDISON has been named chief designing engineer of the Defiance Machine Works, Defiance, Ohio. He goes to the Defiance organization from Cincinnati, where he served as design head and engineer for a number of tool companies. Mr. Addison was born in England and received his academic technical training at Sunderland Technical College.

* * *

WILLIAM A. WALDIE, formerly superintendent of the Carlson Co., Chicago, has been made technical research director of the technical service department of New Wrinkle, Inc., Dayton. Graduating from Harvard in chemistry in 1908, he has been associated with the paint and varnish industry since that time.

* * *

S. MAUS PURPLE, vice-president and general manager of Technical Protective Coatings, Inc., Los Angeles, is making an extensive business tour of Eastern cities.

PROF. CHARLES E. LOCKE, for many years a member of the faculty of the department of mining engineering at Massachusetts Institute of Technology, has been appointed acting head of that department.

♦ ♦ ♦

ARTHUR E. BEARSE and HOWARD PETERS have been added to the technical staff of Battelle Memorial Institute, Columbus, Ohio. Dr. Bearse has been assigned to the industrial chemistry division, and Mr. Peters to research in non-ferrous metallurgy.

♦ ♦ ♦

H. L. HILDENBRAND, for the past five years associated with the Pittsburgh office of the Esterline-Angus Co., Indianapolis, has been appointed representative in the New York metropolitan area.

♦ ♦ ♦

W. W. PEATTIE, president of Northern Engineering Works, has been elected chairman of the Electric Hoist Manufacturers Association.

♦ ♦ ♦

CAPTAIN CHARLES L. HUTCHINSON has been appointed chairman of the Pioneer Steamship Co., Cleveland, and his son, JOHN T. HUTCHINSON, succeeds to the presidency.

♦ ♦ ♦

VINCENT CADA, Eaton Mfg. Co., Cleveland, has been elected president of the Purchasing Agents' Association of Cleveland. Other officers include: J. R. KEACH, Ohio Rubber Co., and P. T. SKOVE, Perfection Stove Co., vice-presidents; and A. C. MADER, Bishop & Babcock Co., secretary-treasurer.

♦ ♦ ♦

H. P. MEE has been elected executive vice-president, Cleveland Tractor Co., Cleveland. E. M. BELL has been named treasurer. Mr. Mee was formerly vice-president in charge of sales service and advertising of Caterpillar Tractor Co. Mr. Bell has been with Cleveland Tractor Co. several years and formerly was secretary-treasurer of the Sayre Steel Construction Co., New York.

♦ ♦ ♦

LYON McCANDLESS has been elected vice-president of the H. K. Porter Co., Pittsburgh. He is also vice-president of the Burgess Co., Inc., Beaver Falls, Pa.

♦ ♦ ♦

CHARLES L. RICE, vice-president of the Western Electric Co. and manager of the company's Hawthorne Works

in Chicago, has been elected to the board of directors.

♦ ♦ ♦

WILLIAM A. SCHEUCH, works manager of the Nassau Smelting & Refining Co., subsidiary of Western Electric Co., has been elected a vice-president.



F. G. SCHRANZ

dent of the Nassau company. He joined the Bell system in 1916 as a metallurgist in the Bell Laboratories.

♦ ♦ ♦

JOHN W. TODD has resigned, effective April 30, as secretary of the Charles Dreifus Co., scrap iron dealers, Pittsburgh. He has announced no plans for the future.

♦ ♦ ♦

C. R. STEPHENS, who has been identified with the Wickwire Spencer Steel Co., New York, for the past 19 years, has been appointed acting sales manager of the Pacific Coast district, with offices at 101 Townsend Street, San Francisco. He succeeds the late H. A. Larsen. Mr. Stephens was first affiliated with the company's wire rope plant at Palmer, Mass., and in 1928 joined the sales department.

♦ ♦ ♦

H. LOUIS STETTLER, JR., partner in the public accounting firm of Naegele & Stettler, has been elected a director of the Akron Brass Mfg. Co., Inc., Wooster, Ohio, succeeding V. I. MONTENYOHLL, who has resigned.

Middletown, Ohio, Honors C. R. Hook

CITIZENS of Middletown, Ohio, on April 18 gave a "Community Appreciation Dinner" for Charles R. Hook, president of the American Rolling Mill Co. A demonstration of community regard, the dinner was sponsored jointly by the employees of the Armco Middletown plant and merchants and professional people of the city.

Mr. Hook was praised for his leadership of industry during his term as president of the National Association of Manufacturers and for leadership during the 36 years he has been a resident of Middletown and an employee of Armco.

A.I.S.E. Visits New Plant At Detroit

THE Detroit section of the Association of Iron and Steel Engineers acted as host April 19 for a national meeting of the association. Feature of the meeting was inspection of the new coke plant and blast furnace recently completed by the Great Lakes Steel Corp. at Ecorse. At a technical program, details of the new plant equipment were explained. Raymond M. Hughes, assistant chief engineer, and William J. Rees, mechanical engineer, of Great Lakes, explained the "Design and Construction of the New Blast Furnace at Great Lakes Steel Corp." Charles P. Betts, superintendent of the coke plant, Hanna Furnace Division, and Phillip C. Vetter, engineer at Great Lakes, explained the "Design and Construction of the New Coke Plant at Great Lakes."

Bogert & Carlough 40 Years Old; All Founders Now Living

ALL incorporators of the Bogert & Carlough Co., Paterson, N. J., maker of steel windows and doors, on April 9, 1899, are still alive. They are Eugene Bogert, Harrington Park, N. J.; Daniel Carlough, Jr., and William H. Belcher, both of Paterson. The company once made structural steel but abandoned this line for the products known as Boca steel windows and doors. Eugene Bogert is president of the company and C. A. Bogert is vice-president.

... OBITUARY ...

DR. CLARENCE FLOYD HIRSHFELD, chief of the research department of the Detroit Edison Co. since 1913, died April 19 in Detroit after a long illness. He was 58 years old. His death brought to a close a 36-year career in engineering, research, education and science. In 1937 he was the recipient of the Worcester Reed Warner medal of the American Society of Mechanical Engineers. His

research work covered a variety of industries including industrial electrical heating, disposal of industrial waste, electric welding, electric furnaces and new methods of developing electrical energy.

* * *

JAMES M. NELSON, retired superintendent of the open-hearth and bessemer department of the Campbell plant of Youngstown Sheet & Tube Co., died April 13 in a Youngstown

hospital after a long illness. Prior to joining Sheet & Tube he had worked for Brier Hill Iron Co., Algoma Steel Co., and Carnegie Steel Co. He was 64 years old.

* * *

EDWARD PURNELL, steel worker who went to Youngstown approximately 62 years ago from England, and father of Frank Purnell, president, Youngstown Sheet & Tube Co., died April 14 in a Youngstown hospital at the age of 95. He was prominent in church circles at Youngstown. On his 94th birthday he was honored with a service by the congregation of Plymouth Congregational Church, which he helped organize.

* * *

CONRAD E. ANDERSON, president of Aluminum & Metals Corp., Detroit, died April 21 at his home after a long illness. Mr. Anderson was born in Sweden in 1883 and had lived in Detroit 25 years.

* * *

WILLIAM A. BAKER, vice-president and sales manager of the American Electrical Heater Co., died April 20 at Detroit of a heart ailment. Mr. Baker, who was 63 years old, was born in Lexington, Mich. He had been associated with the heater company for 32 years.

* * *

GEORGE C. W. KLIPPEL, manager of the patent division of Republic Steel Corp., Cleveland, died in a Cleveland hospital April 17 after being stricken with a cerebral hemorrhage at his office. He was 53 years old. Mr. Klipper was born and educated in Chicago, going to Ohio 25 years ago to work for the Elyria Iron & Steel Co. At the time of the company's merger with the Republic Steel Corp. in 1930 he was credit manager. He was then placed in charge of the patent division of the corporation.

* * *

J. WATSON LONG, former president, Mahoning Foundry Co., died April 15 in Warren, Ohio. Mr. Long was born in New Castle, Pa., Oct. 16, 1861, and was president of the foundry until 1924.

* * *

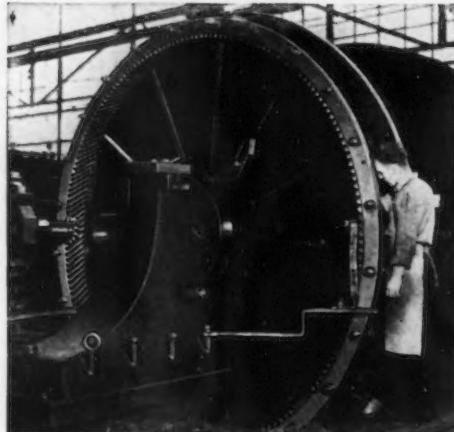
C. A. ROSS, president of Ross Operating Valve Co., Detroit, since its organization in 1921, died at his home April 11 of a heart attack. Mr. Ross was born in Pennsylvania 56 years ago, was active in engineering work

Now You Can Get INTERNAL GEARS

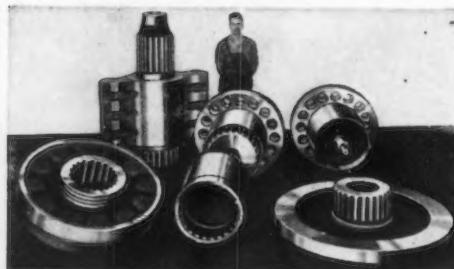
Accurately Generated In Any Size up to 18 Feet Diameter

By making internal gears available in any size up to 18-feet diameter, 12-inch face and 1½ D.P., and generated with either spur or helical teeth, Farrel engineers have narrowed another limitation of gear design and broadened the field of application. Internal gears of large size often meet design and operating conditions better than other types of gears. Designers may now make use of internal gears in many applications where formerly they were inhibited by inability to obtain satisfactory gears with generated internal teeth in the larger sizes.

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The Gear with a Backbone

previous to his organization of his own company. He was engineer in charge of construction of Detroit Seamless Steel Tube plant and previous to that was with Standard Engineering Co. of Pennsylvania. Ross was the inventor of the valve system which bears his name. He was a member of the National Association of Manufacturers and of the Detroit Board of Commerce.



HOWARD ROSS WARREN, treasurer of the Sheffield Steel Corp., Kansas



JOHN G. OLIVER, chairman of the board of Bardons & Oliver, Inc., Cleveland, whose death was announced in these columns last week.

City, for nearly 30 years died suddenly last week. Mr. Warren started with Sheffield as a bookkeeper and was so able an accountant that about 10 years after he entered the accounting department he was made treasurer of the company. Mr. Warren's first business experience was gained with an implement company and when in 1900 he entered the steel business it was with the old Kansas City Bolt & Nut Co., later absorbed by Sheffield.



CHARLES K. TRIPP, superintendent of the General Electric Co.'s apprentice school at Lynn, Mass., since it was founded in 1902, died suddenly on April 20 in the company dispensary. He was born in Saratoga 68 years ago and joined the General Electric Co. in 1899.

CICERO M. CUNLiffe, an engineer for the American Blower Corp. for 40 years previous to his retirement 18 years ago, was buried April 18 at Detroit. Mr. Cunliffe had been ill several years. He was born in Drumbow, Ont., 80 years ago.



HOWARD P. GRIBBLE, for the past 20 years superintendent of the forge division of Hayes Steel Products, Ltd., Merriton, Ont., died on March 18.

ROBERT A. FLANAGAN, manager of the Philadelphia branch of the Lansing Co., Lansing, Mich., died at his home in Brookline, Pa., on April 11, aged 46 years. He had been connected with the company in various capacities since 1908.



WILLIAM HEYBURN, formerly chairman of the board and president of the Belknap Hardware & Mfg. Co., Louisville, Ky., died of heart disease on April 21, aged 77 years.



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Increasing useful life of carburizing pots is the quickest way to decrease unnecessary frequent replacements and costly delays.

On the "cost per heat hour" basis, MICHIANA pots, retorts, boxes, and other heat-resistant alloy parts have made records which heat-treating engineers and production executives have seen translated into reduced costs and more uniform results.

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THE NEWS IN BRIEF

Household washer shipments reach of 1937.—Page 51.
highest level since third quarter

A.S.T.M. standards appear in one book.—Page 51.

Industrial leaders tell the nation what they have done and are doing to propel the United States to new industrial frontiers and still higher standards of living.—Page 52.

Forum reflects progress in machine tool electrification at the fourth annual meeting at Westinghouse Electric & Mfg. Co.—Page 54.

Crosley midget car, to be unveiled Friday at Indianapolis, regarded as guinea pig. Studies continue on rust-resistant material for automobile mufflers. Better fuels in 1940 presage change in carburetor system and fuel pump. Fill-in steel buying offers more support to steel industry in past week.—Page 56.

Wagner Act revision depends on strength of attack; NLRB aides' laughter at Congressional committee's questions may spur amendment drive.—Page 60.

The Commerce Department estimates 590,000 new houses yearly until 1944.—Page 62.

Farm equipment made in 1938 is valued at \$488,955,589, against \$580,048,914 in 1937.—Page 62.

NLRB orders employees' association in Kansas City plant disestablished.—Page 64.

Revised specifications for railroad passenger cars are issued by Association of American Railroads.—Page 64.

U. S. may get more machinery orders in Holland, since German factories are too busy.—Page 64.

Government steel buying increases during the week ended April 15, totals \$1,075,035.81.—Page 66.

SWOC advises Gary steel workers to carry their dues cards.—Page 66.

Japanese machinery exports from U. S. likely to be at new high in 1939.—Page 66.

A.I.S.E. members visit Great Lake Steel Corp. new coke plant and blast furnace.—Page 69.

All incorporators of Bogert & Carlough Co., founded 40 years ago, still living.—Page 69.

Middletown, Ohio, honors Charles R. Hook, American Rolling Mill Co. president.—Page 69.

Navy may be authorized to conduct further tests on centrifugal casting and hard-surfacing of guns.—Page 74.

Hewitt Rubber Corp., Buffalo, celebrates its 80th anniversary.—Page 74.

Congress is told that development of manganese industry is costly to public.—Page 74.

Allegheny-Ludlum to give \$2,000 air race prize.—Page 75.

United Engineering & Foundry Co.'s foreign trade has helped its output, George T. Ladd tells stockholders.—Page 75.

United Engineering's Wooster plant moves to Youngstown.—Page 75.

Freight rates are the biggest handicap to South's development, Hugh Morrow says.—Page 76.

Hydro-Power Systems, Inc., Mt. Gilead, Ohio, is formed to make hydraulic drives.—Page 76.

Schiavone Bonomo Corp., scrap broker and dealer, moves to own building in Jersey City.—Page 76.

Tom M. Girdler, B. F. Fairless, Arthur Roeder will be among speakers May 25 at the American Iron and Steel Institute general meeting.—Page 83A.

U. S. Steel of Delaware opens Chicago office; G. Cook Kimball is elected executive vice-president.—Page 83A.

A. O. Smith Corp. announces new pipe process, expands line of oil well casing.—Page 83A.

General Electric Co. sales during first quarter are 5 per cent above like period last year.—Page 84.

Wm. B. Scaife & Sons Co. sponsors Mellon Institute research on fabrication and use of metal tanks, pressure cylinders.—Page 102.

Technological progress in U. S. since 1914 triples buying power of factory wage, Machinery & Allied Products Institute finds.—Page 102.

Joseph T. Ryerson & Son, Inc., enlarges steel-service plant at Cambridge, Mass.

Leon Henderson, new SEC head, opposes British plan of steel industry control for U. S. industry.

John L. Lewis' coal strike hampers Ohio industry, puts 2100 railroad employees on idle list.

"Defense" industries in 1938 took less than 20 per cent of machine tool output, National Machine Tool Builders Association is told.

SECTIONS INDEX

Personals	68
Obituary	70
Steel Ingot Production	85
Summary of the Week	86
Comparison of Prices	87
Pittsburgh, Chicago, Cleveland, Philadelphia and New York Markets	88
Fabricated Steel	81
Non-ferrous Market	93
Scrap Market and Prices	94-95
Finished Iron & Steel	96-97
Pig Iron & Raw Material Prices	98
Warehouse Prices	99
Plant Expansion & Equipment 100-101	
Machine Tool Activity	102

MEETINGS

April 26 to 29—Electrochemical Society, Columbus, Ohio.	
May 1 to 4—Chamber of Commerce of the United States, Washington.	
May 15 to 18—American Foundrymen's Association, Cincinnati.	
May 16 and 17—American Steel Warehouse Association, Chicago.	
May 22 to June 8—Society of Automotive Engineers, world congress, in various cities.	
May 24 and 25—National Metal Trades Association, Chicago.	
May 25—American Iron and Steel Institute, New York.	
May 25 to June 1—Triple Convention (American Supply and Machinery Association, the National Supply and Machinery Distributors' Association and the Southern Supply and Machinery Distributors' Association), on board the S.S. Monarch of Bermuda.	
June 5 and 6—Associated Machine Tool Dealers, Schenectady.	
Oct. 23 to 27—National Metal Congress, Chicago.	



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Congress Told Home Manganese Industry Is Costly to Public

WASHINGTON — Congressman Charles I. Faddis, Democrat of Pennsylvania, and sponsor of one of the pending bills to create a stock pile of strategic war materials, said last week that the American Manganese Producers Association had "cajoled Congress into unwise legislation on

manganese" and the American public had thereby paid out some \$70,000,000 in "a futile attempt to develop a domestic manganese industry by the imposition of a heavy import duty."

The Congressman, who was replying directly to the contention advanced several weeks ago by J. Carson Adkerson, president of the association, that the Faddis bill fell short of providing for the development of domestic resources, said in a four-page extension of remarks in the Congres-

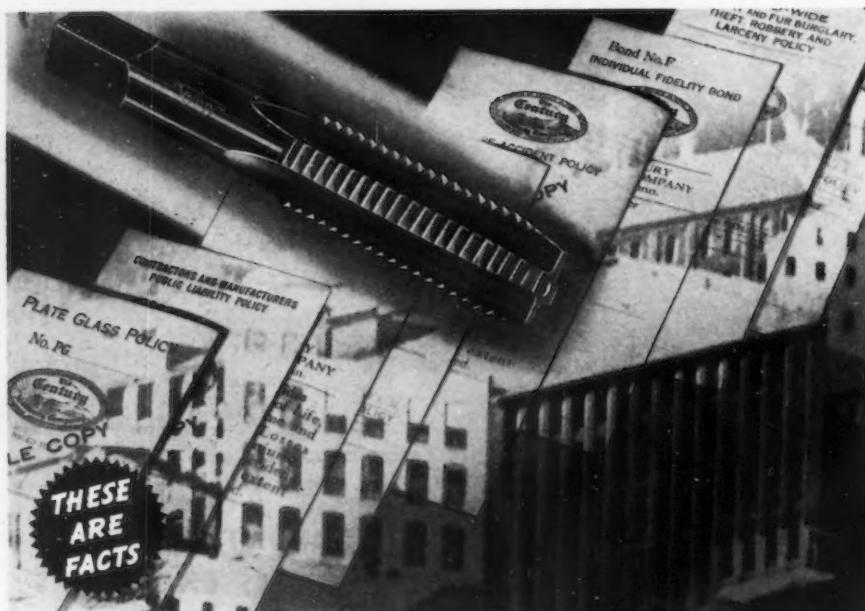
sional Record that it was "not surprising" that the steel industry had not thrown money away in a hopeless attempt to develop a domestic manganese industry. Steel companies, he asserted, have maintained consistently since 1922 that domestic resources would not support an industry and experience to date has proven the correctness of their judgment.

Taking issue with Mr. Adkerson and citing recent purchases of ferromanganese for a stock-pile reserve as illustrative of the support given the manganese industry by the Government and as indicative that it is adhering closely to the Buy American Act, the Pennsylvanian said the Navy paid \$114.45 per long ton for the domestic product while the low bid on the same contract for imported ferro-manganese was \$78.30. Faddis attributed the \$36.14 difference per ton, or 46 per cent, to the protection which the domestic industry has through the tariff and the Buy American Act.

Protesting against the activities of the association, he took the position that his proposal to build up war reserves is primarily a national defense move, adding that "nothing should be injected into this bill that would limit its effectiveness as a national-defense measure."

Would Authorize Naval Gun Casting Tests

WASHINGTON—The Navy Department would be authorized to conduct further tests to determine whether it can adopt the centrifugal process of casting naval guns and hardsurfacing them with boron-carbide or tungsten carbide lining, under a proposal made last week by Congressman James G. Scrugham, Democrat of Nevada and chairman of a House Naval Appropriations Subcommittee. His proposal was made, he said, in an effort to cut down the cost of manufacturing naval guns, which now runs in the neighborhood of \$1,000,000 each year.



INSURED against Production Loss, too

"'Maxi' taps turned out to be real insurance against production loss," writes this Pennsylvania Manufacturer.

"We were tapping seamless steel tubing. Our best previous record was 80 holes per tap. With a 'Maxi' tap we threaded 1200 holes, and

as far as we could see the tap showed absolutely no signs of wear."

"Maxi" taps insure against loss on tool costs and production time. Their special surface treatment has been developed by "Greenfield" to meet modern requirements. Identify them by their jet black finish.

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GREENFIELD



United's Trade Abroad Worth While, Ladd Says

PITTSBURGH—Efforts of United Engineering & Foundry Co. in developing foreign trade have covered every industrial country and have contributed generously to output, George T. Ladd, president, told stockholders at the annual meeting.

The company's machinery business began a promising rise in the third quarter of 1938 and roll sales started to improve in the fourth quarter, Mr. Ladd said. For the third successive year the company in 1938 exceeded the annual record of any of the first 35 years of its existence. The net earnings of \$3,192,618, equal to \$3.82 a common share, were second only to the previous year when \$4,043,644, or \$4.86 a common share, were earned.

Mr. Ladd said United Engineering has built nearly one-half of the world's 4-high mill stands. United-International, Limited, has been formed in France, of which United Engineering is a 50 per cent owner, and in Australia arrangements have been made for the manufacture and sale of rolls through the Broken Hill Proprietary Company, Limited. United Engineering also holds 60,000 shares, or about 10 per cent of the outstanding stock of Davy & United Engineering Company, Limited, a large English manufacturer, and has a commission arrangement with Dominion Engineering Works, Ltd., in Canada.

The company also announced recently the formation of a branch plant to be located in Japan and to be known as "Shibaura-United," organized for the manufacture of rolling mill equipment for use ONLY in Japan and China.

Allegheny-Ludlum to Give \$2000 Air Race Prize

ALLEGHENY-LUDLUM STEEL CORP. has announced that a \$2000 cash purse and trophy would be awarded the Thompson Trophy Race winner who establishes a new speed record in the 1939 National Air Races at Cleveland this fall, according to Hiland G. Batcheller, president.

United Engineering's Wooster Plant Moves to Youngstown

PITTSBURGH—United Engineering & Foundry Co. is abandoning its Wooster, Ohio, plant and will

consolidate major machine tools and machinery with its Youngstown plant. Important equipment from Wooster will be located partly in existing buildings at Youngstown and partly in new buildings to be constructed in the near future.

A portion of the Wooster plant's facilities will be shipped to Japan where United Engineering & Foundry Co. has formed a branch plant to be known as the "Shibaura-United." The establishment of the Japanese branch

is to facilitate the manufacture of rolling mill machinery for use in the Japanese empire. United has furnished substantial equipment to Japan for rolling of flat rolled material.

The status of the Canton, Ohio, works, the Pittsburgh works, and the Vandergrift, Pa., works remains unchanged.

Carboly Co., Detroit, has just moved into its new plant in the Eight Mile-Mound Road industrial area near the Rotary Electric Steel Co. plant and the new Briggs Mfg. Co. plant.

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A new booklet "Metal Cutting Lubrication—In Theory and Practice," is on the press. Write for your free copy.



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SERVICE PROVED INDUSTRIAL OILS

Schiavone Bonomo Corp. Moves To Its Own Building

SCHIAVONE BONOMO CORP., scrap broker and dealer, marked its fortieth year in business by moving, on April 24, to a new office building at the foot of Jersey Avenue, Jersey City, N. J. All office and administrative departments, which have been divided between New York and New Jersey as the result of the growth of the corporation during the last 10

years, will now be centralized in a modern two-story structure.

The building is air-conditioned throughout and is thoroughly fire-proof, being constructed entirely of steel, concrete and brick. The ground floor includes a large garage, metal room, machine shop, electric power room, acetylene room, shower and locker rooms for the entire staff, first-aid room, reception room and weighmaster's office with the latest railroad type dial Fairbanks scale attached.

The second floor comprises executive offices, a large staff room and provisions for showers, rest rooms, etc., for men and women, as well as a large reception room. A unique feature of the construction was the driving of 400 piles of 80-ft. lengths for the foundations.

"This new plant, which will include a new modern scrap iron yard adjoining the building," declared Michael V. Bonomo, "evidences our corporation's faith in the future of the scrap industry and in the future of American industry."

The officers of the corporation are Louis Schiavone, president; Michael V. Bonomo, treasurer; Herman D. Moskowitz, vice-president; Benjamin Schwartz, vice-president, and Richard V. Bonomo, secretary. Michael Bonomo and Mr. Moskowitz are past presidents of the Institute of Scrap Iron and Steel, while Mr. Schwartz was formerly the director-general of the institute.

Hydro-Power Systems, Inc. To Make Hydraulic Drives

WITH complete manufacturing and engineering facilities at Mount Gilead, Ohio, Hydro-Power Systems, Inc., has recently been organized for the manufacture and further development of hydraulic machine drives and their component parts—radial pumps, gear pumps, valves and controls. The equipment has heretofore been made by the Hydraulic Press Mfg. Co. of Mt. Gilead for use on its Fastraverse presses. The system features a closed hydraulic circuit in which the flow is controlled entirely through adjustment of the radial pump stroke. Two models of radial pumps are made as well as gear pumps for operating auxiliary circuits. A line of piston valves and pilot circuit valves is also being offered. All these original developments of H-P-M are fully protected by patents.

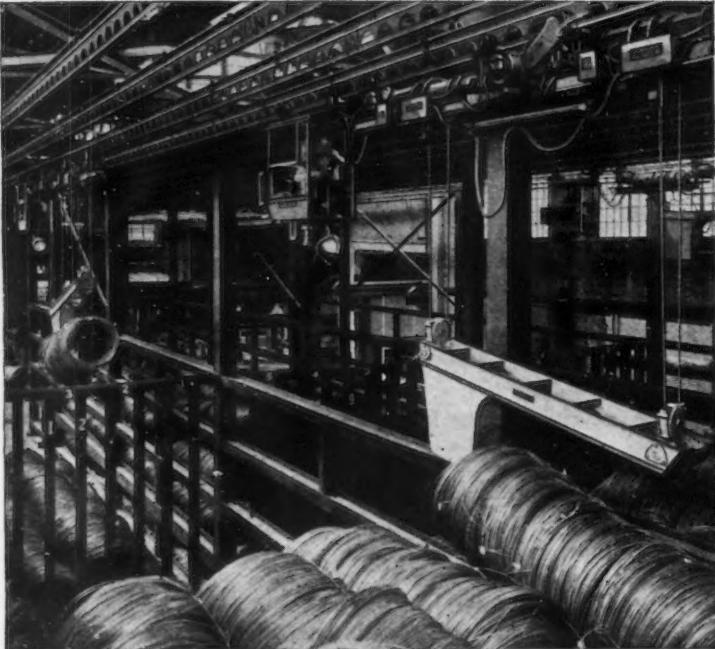
Freight Rates Penalize South, Morrow Says

C HICAGO—Hugh Morrow, president, Sloss-Sheffield Steel & Iron Co., Birmingham, recently told the Economic Club here that the greatest contribution to the South's economic problems is a system of freight rates which for a long time "has penalized and discriminated against" the commerce of the South. This, he said, could in all probability, be remedied by a mere nod or a gesture from President Roosevelt.

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OVER HEAD HANDLING EQUIPMENT IN THE ROD AND WIRE MILL



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Henderson Opposes British Plan of Regulating Steel

WASHINGTON—The so-called self-government of the British iron and steel industry by the British Iron and Steel Federation is criticized in a five-page typewritten memorandum prepared by Leon Henderson, executive secretary of the Temporary National Economic Committee.

The report is taken to be a warning that the American iron and steel or other industry should not be allowed to operate upon the principle which controls the British iron and steel industry. The chief thought in Mr. Henderson's mind appears to be that the system allows the fixing of prices. This is indicated by his approval of a series of articles on steel prices appearing in *The Economist* of London, published in its issues of Dec. 10 and 17, 1938, wherein it is stated that "the fact is that no body of producers, given the power to fix its own prices, can resist the temptation to fix them too high."

Mr. Henderson, an economist, was nominated on Monday by President Roosevelt to be a member of the Securities and Exchange Commission to fill the vacancy occasioned by the appointment of William O. Douglas to the Supreme Court, and has been influential in the procedure of the TNEC. Formerly he was director of the NRA Research and Planning Division and while favorable to wide Government regulation of industry has consistently opposed the principle of so-called industrial self-government, such as, it is maintained, operates in the British iron and steel industry.

Mr. Henderson's warning against a like principle in American industry was interpreted by some to mean that, rather than self-regulation, he is in accord with the suggestion during the TNEC steel hearings by Jerome Frank, a member of the SEC, of some kind of industry-by-industry government regulation of competition.

Though the industry - by - industry plan is said to have strong Administration support, prevailing sentiment in the TNEC for such a scheme apparently does not run in that direction nor has there been any intimation that it has even given thought to adoption of the British Iron and Steel Federation principle. But if there have been any views leaning to the latter plan, Mr. Henderson clearly has attempted to flash the red light on it.

Ryerson Enlarges and Modernizes Boston Plant

BOSTON—Reconstruction of the Ryerson Steel-Service plant at Third and Binney Streets, Cambridge, Mass., greatly increases facilities for stocking steel and allied products for the New England States. Total ground area occupied has been increased more than 30 per cent and storage facilities to a still greater extent, through the use of multiple story building, special racks and platforms. A new high-bay

type mill building was erected for the heavy structural lines such as beams, angles, channels, etc. Other buildings were extended and remodeled for better service on all types of shipments.

Offices, too, have been completely rebuilt and arranged to facilitate the handling of orders. More than 5000 new items have already been added to stocks. This includes many new qualities as well as additional sizes and shapes. Joseph T. Ryerson & Son, Inc., operate 10 steel-service plants in principal industrial cities.



We are enlarging the facilities of your plant



The hundreds of manufacturers who look upon Andrews Steel as an integral unit of their own production are enjoying the experience of having their own facilities increased by the expansion program nearing completion at the Andrews plants.

New products* are being added; new production processes developed; new equipment and the most modern control systems installed—all with a single objective—to better serve Andrews customers.

If you have not availed yourself of Andrews Steel complete facilities, including its manufacturing and fabricating divisions, you will find it worth while to learn how this comprehensive service can be employed to your advantage.

ANDREWS PRODUCTS in Carbon and Alloy Steel: Blooms

- Forging Billets • Re-rolling Billets • Slabs • Universal Mill Plates • Sheet Bars. NEWPORT PRODUCTS: Hot Rolled Sheets • Cold Rolled Sheets • Newport Electrical Sheets • GOHI Pure Iron-Copper Alloy Sheets • Globe Brand Galvanized Steel Sheets • GOHI Enameling Iron Sheets • KCB Copper Steel Sheets • Newport Long Terne Sheets • Newport Galvannealed and DeLuxe Metal Sheets • GLOBE PRODUCTS: Galvanized Iron and Steel Roofing and Formed Sheet Metal Building Materials.



*to be announced shortly—Hot Rolled Bars and Allied Shapes in Carbon and Alloy Steel.

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Compactness, Efficiency, Economy, and Durability characterize our line of air compressors, built in many types and sizes up to 200 cu. ft.—suitable for a great variety of requirements in mill and factory. There is one in this extensive line to meet your needs... Write for literature and prices.

The compressor illustrated is Type "Y", two-cylinder, two-stage, air-cooled, for continuous operation against 200 lbs. pressure. Available in sizes from 3.6 to 41 cu. ft. Superior design, high grade materials, and skilled workmanship, make these machines all that a compressor outfit should be. Catalogue 2051.

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Fenstermaker Heads Concrete Steel Institute

THE 15th annual meeting of the Concrete Reinforcing Steel Institute was held April 20-21 at Augusta, Ga. About 100 members heard Alan H. Temple of the National City Bank of New York discuss "Future Needs for Construction," and A. E. Lindau, chairman of the institute's committee on engineering practice, outline the research program at Lehigh University. One of the most valuable results of the work of this committee is their experimentation with rust of reinforcing bars, on which subject a pamphlet report is soon to be issued.

J. Ralph Fenstermaker, president, Hugh J. Baker & Co., Indianapolis, was elected president of the institute, and George Connors, Jr., president of Connors Steel Co., Birmingham, was named vice-president. James F. Curley, vice-president, Concrete Steel Co., and E. W. Langdon, Joseph T. Ryerson & Son, Inc., were re-elected vice-president and treasurer respectively.

Harry C. Delzell was elected executive secretary to succeed Mark Beeman, who is retiring. Mr. Delzell was formerly engaged in promotional work for the Portland Cement Association and the Federal Housing Administration.

Textile Machinery Exports Off in Reich

WASHINGTON—Germany's export trade in textile machinery decreased from a value of \$45,458,000 in 1937 to \$37,386,000 in 1938, or 17 per cent, according to a report from Consul J. F. Huddleston, Dresden, made public by the Department of Commerce. Exports to the United States in 1938 were valued at \$1,651,000, approximately 6 per cent less than in 1937. Imports into Germany of textile machinery during 1938 were valued at \$2,997,000 against \$2,126,000 in the preceding year. The United Kingdom was the most important source of these imports.

Wickwire Spencer Steel Moves To General Offices

WICKWIRE SPENCER STEEL CO. and its subsidiary, the American Wire Fabrics Corp., on May 1 will move their combined general offices and eastern district sales offices to 500 Fifth Avenue, New York. The office is now at 41 East 42nd Street.

Steel Warehouse Chapters Elect

CLEVELAND. The following chapters of the American Steel Warehouse Association have elected officers as follows for the coming year:

Baltimore chapter: President, H. A. Lowry, Seaboard Steel & Iron Corp.; vice-president, T. P. Walker, J. B. Kendall Co., Washington, D. C.; secretary, Eugene Mowlds, Scully Steel Products Co.; national director, George J. Parke, Eagleston-Parke, Inc., Norfolk, Va.

Buffalo chapter: President, E. J. Wichter, Edgar T. Ward's Sons Co.; vice-president, J. Comer, Dobbie Foundry & Machine Co., Niagara Falls, N. Y.; secretary-treasurer, W. B. Huntley, Brace-Mueller-Huntley, Inc., Rochester; national director, W. H. Kline, Burke Steel Co., Inc., Rochester.

Pacific Northwest chapter: President, H. F. Morrow, Pacific Metal Co., Portland; vice-president, Wm. R. Case, Seattle Steel Co., Seattle; secretary-treasurer, Everett W. Hawkins, Portland; national director, John B. Robbins, A. M. Castle & Co., Seattle.

Philadelphia chapter: President, J. W. Patrick, Jr., Peter A. Frasse & Co., Inc.; vice-presidents, L. Norris Hall, L. Norris Hall, Inc., and Leslie Edgcomb, Edgcomb Steel Co.; secretary-treasurer, James J. Collins, L. Norris Hall, Inc.; national director, A. C. Allshul, Joseph T. Ryerson & Son, Inc.

Connecticut chapter: President, R. B. Shearer, C. S. Mersick & Co., New Haven; vice-president, S. H. Hascall, Blodgett & Clapp Co., Hartford; secretary-treasurer, G. S. Brouso, C. S. Mersick & Co.; national director, R. B. Shearer.

New England chapter: President, P. F. Avery, Avery & Saul Co., South Boston; vice-presidents, C. Harvey, Arthur C. Harvey Co., Allston, and Quincy W. Wales Co., Boston; secretary-treasurer, J. B. McIntyre, Scully Steel Products Co., Allston; national director, Richmond Lewis, Charles C. Lewis Co., Springfield.

New York chapter: President, M. W. Failloute, Failloute Iron & Steel Co., Newark, N. J.; vice-presidents, P. O. Grammer, Grammer, Dempsey & Hudson, Inc., Newark, N. J., and W. C. Hughes, Bright Steel Corp.; secretary-treasurer, Charles Kramer, Scully Steel Products Co., Newark, N. J. Mr. Grammer will also serve as national director.

Northern California chapter: President, M. S. Donaldson, A. M. Castle & Co., Oakland; first vice-president, J. R. Wenzler, Federal Pipe & Supply Co., San Francisco; second vice-president, H. E. Oliphant, Tay-Holbrook, Inc., San Francisco; secretary, R. D. Cortelyou, San Francisco; national director, Howard M. Tayler, Tayler & Spotswood Co., San Francisco.

American Rolling Mill Co. Adds to Coal Barge Fleet

MIDDLETON, Ohio—The American Rolling Mill Co., which has placed orders for 30 steel barges (details published in market section), is also constructing a coal tipple at Huntington, W. Va., for the handling of coal to be shipped from the company's mines at Nellis, W. Va., by river from Huntington to Cincinnati for its plants at Hamilton and Middletown. The barges will cost about \$300,000 and the tipple \$100,000.

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CAST IRON PIPE

Brookline, Mass., has placed 360 tons of 6 to 12-in. pipe with Donaldson Iron Co., Emaus, Pa.

New Britain, Conn., has under advisement bids on 200 tons of 30-in. pipe. United States Pipe & Foundry Co. and R. D. Wood & Co. are bidders.

Woonsocket, R. I., has placed 100 tons of 6 to 8-in. pipe with Warren Foundry & Pipe Corp., Everett, Mass.

Jamaica Water Supply Co., 161-20 Eighty-ninth Avenue, Jamaica, L. I., has secured permission to dispose of stock issue to total at least \$1,500,000, of which not less than \$514,800 is to be deposited in special fund for extensions and replacements in pipe lines, de-

velopment of five new wells with pumping stations, reservoirs and auxiliary structures.

Board of Awards, City Hall, Baltimore, will close bids on or about May 3 for pipe for main water supply system in southeastern district.

Bloomfield, Ky., closes bids May 3 for pipe for water system and other waterworks installation, including elevated steel tank and tower. J. S. Watkins, McClelland Building, Lexington, Ky., is consulting engineer.

Matthews (Delaware County), Ind., will take bids soon for 7450 ft. of 6-in., 7950 ft. of 4-in., 2000 ft. of 2-in., and about 50 ft. of 8-in. pipe for water system; alternative bids will be asked on transite pipe; also for 60,000 to 75,000-gal. elevated steel tank and tower, turbine pumping unit with capacity of 200

gal. per min., and accessory equipment. O. T. Hancock, Plainfield, Ind., is consulting engineer.

Eden, Tex., plans about 9600 ft., various sizes, for extensions in water system; also for 750,000-gal. concrete reservoir, pumping machinery with capacity of about 500 gal. per min., and auxiliary equipment. Financing is being arranged through Federal aid. Freese & Nichols, Capps Building, Fort Worth, Tex., are consulting engineers.

Corsicana, Tex., plans pipe line extensions and replacements in water system and other waterworks installation. Cost about \$125,000. Freese & Nichols, Capps Building, Fort Worth, Tex., are consulting engineers.

General Purchasing Officer, Panama Canal, Washington, asks bids until May 4 for 2600 ft. of cement-lined cast iron water pipe (Schedule 3451).

Rifle, Colo., plans pipe line extensions in water system; also other waterworks installation. Bond issue of \$35,000 is being arranged.

Rolla, N. D., asks bids until May 1 for 2250 ft. of 6-in. pipe for water system, including fittings and other waterworks equipment.

San Luis Obispo, Cal., has authorized bond issue of \$50,000 for pipe line extensions in water system, rebuilding reservoir and installation of chlorinating plant, work to begin soon. Kenneth Beck is city engineer.

Sacramento, Cal., has awarded 15,000 ft. of 4 and 6-in. pipe to American Cast Iron Pipe Co., San Francisco.

Long Beach, Cal., has taken bids on 30,000 ft. of 6-in. and 5040 ft. of 6-in. class B or 150 pipe.

... PIPE LINES ...

Penn-O-Tex Oil Co., Plymouth Building, Minneapolis, Minn., plans steel pipe lines in conjunction with new bulk oil storage and distributing plant on Mississippi River waterfront, near Washington Avenue bridge, for underground oil transmission to several consuming interests, including Zephyr Oil Co., Hiawatha Avenue. Plant will have initial capacity of 6,000,000 gal., and pipe line facilities will be provided to handle such output. Entire project will cost about \$200,000. Frank Starling is manager.

Bureau of Reclamation, Denver, asks bids until May 3 for two 72-in. i.d., welded plate-steel outlet pipes for outlet works at Fresno dam, Milk River project, Mont. (Specifications 1221-D).

General Gas Pipe Line Corp., Circle Tower Building, Indianapolis, has secured ruling of Federal Power Commission, Washington, to dismiss without prejudice its recent application for permission to build 20-in. welded steel pipe line from gas field in Hart County, Ky., to connection with present lines in Hamilton County, Ind., about 180 miles, for natural gas transmission, and project will be held in abeyance. Request for dismissal was made by company following decision of commission that it would not meet demand made to treat as confidential information to be given regarding exact source of supply, financing and other data to be presented for approval of application.

El Paso Natural Gas Co., El Paso, Tex., will build welded steel pipe line to Miami, Ariz., connecting with new main trunk line from point near Lordsburg, N. M., through Arizona, recently approved, for natural gas transmission, and thence to plant of Miami Copper Co., Miami district, which has contracted with company for natural gas supply not later than Aug. 1. Gas will be used by company for power station operation. This is part of project of El Paso company to cost over \$1,000,000 for pipe line system in Arizona.

Purchasing and Contracting Officer, Holabird Quartermaster Depot, Baltimore, asks bids until May 2 for steel pipe, steel welded fit-

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This non-skid brake step for box cars is $\frac{1}{4}$ " thick x 30" long x 10" wide. The flange is 1". Embossing around the holes makes the step non-skid. Another of the many types of stampings produced by Parish for many industries.

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tings, steel couplings, nipples, etc. (Circular 398-125).

Ottumwa Gas Co., Ottumwa, Iowa, plans steel pipe lines for extensions in high-pressure gas transmission system. Cost over \$70,000.

Bureau of Reclamation, Denver, closes bids May 3 for welded plate-steel penstock by-pass piping for Elephant Butte power plant, Rio Grande project, New Mexico-Texas; also for penstock-tunnel concreting equipment, and turbine test head and test ring, same power plant (Specifications 1217-D).

Gulf Refining Co., New Orleans, plans two 6-in. steel pipe lines for oil transmission in connection with new bulk loading terminal on waterfront at Baton Rouge, La. Main offices are in Gulf Building, Pittsburgh.

REINFORCING STEEL

... Awards of 4900 tons; 15,600 tons in new projects.

ATLANTIC STATES

AWARDS

900 Tons, New York, contract 318, Delaware Aqueduct, to Carnegie-Illinois Steel Corp., Pittsburgh, through Pleasantville Contracting Co., New York.

175 Tons, Clyde, N. Y., school, to Reecon Co., Buffalo.

150 Tons, Stratford, Conn., United Aircraft Co. factory, to Truscon Steel Co., Youngstown.

122 Tons, Somerset County, Pa., section 8-B2, Pennsylvania Turnpike Commission, to Truscon Steel Co., Youngstown.

125 Tons, North Adams, Mass., school, to Truscon Steel Co., Boston.

CENTRAL AND WESTERN STATES

2217 Tons, Grand Coulee Dam, Wash., Columbia Basin project, to Bethlehem Steel Co., Bethlehem, Pa., by Bureau of Reclamation.

295 Tons, Buena, Wash., Yakima project (Invitations 33860-A and 33862-A) to Bethlehem Steel Co., San Francisco.

140 Tons, Sacramento, Cal., high school assembly, to Palm Iron Works, Sacramento, through Campbell Construction Co., Sacramento, contractor.

140 Tons, San Francisco, Lake Street approach viaduct, to Gunn-Carle & Co., San Francisco, through Union Paving Co., San Francisco, contractor.

136 Tons, San Jose, Cal., bridges, to San Jose Steel Co., through Caputo & Keeble, San Jose, contractors.

135 Tons, South Bend, Ind., dormitory, to Republic Steel Corp., Cleveland.

120 Tons, Madison, Wis., women's dormitory, to Truscon Steel Co., Youngstown.

110 Tons, Bryan, Ohio, sewage disposal plant, to Pollak Steel Co., Cincinnati, through Marra & Son, Cleveland, contractors.

100 Tons, Minneapolis, journalism building, to Bethlehem Steel Co., Bethlehem, Pa.

PENDING REINFORCING BAR PROJECTS

ATLANTIC STATES

1735 Tons, Queens, N. Y., Circumferential Highway, 1000 tons on contract MS-39-3-B; 425 tons on MSO-39-6; 190 tons on SC-39-12, and 120 tons on MC-39-13. Bids to Department of Parks, New York.

1400 Tons, Franklin County, Pa., Kittatinny-Blue Mountain tunnel KB-2.

752 Tons, Somerset County, Pa., Allegheny Mountain tunnel.

450 Tons, Springfield, Mass., sewage treatment plant.

308 Tons, Bedford County, Pa., Pennsylvania Turnpike Commission, section 13-B.

275 Tons, Pawtucket, R. I., water filtration plant.

100 Tons, Providence, viaduct; Colman Bros., Boston, contractors.

CENTRAL AND WESTERN STATES

3650 Tons, Chicago, fifth section, subway; new bids asked. John Griffiths & Son Co., Chicago, low bidder previously.

1833 Tons, Seattle, Ballard bridge approaches; also 127 tons of shapes; bids May 4. See structural projects pending for alternate proposal.

950 Tons, Rantoul, Ill., air corps barracks, Lipman Construction Co., Chicago, low bidder.

785 Tons, Los Angeles, Treasury department Invitation A 9153, List 304; bids in.

500 Tons, Panama Canal, C. Z., round bars for Purchasing Officer; bids in.

500 Tons, Chicago, housing, 87th Street and Cottage Grove.

500 Tons, Cleveland, Valleyview Housing project; bids April 28.

459 Tons, Buena, Wash., Yakima project (Invitation 33868-A); bids in.

400 Tons, Honolulu, T. H., Kamehameha School; bids May 15.

332 Tons, Kingsburg, Cal., Kings River bridge; bids May 10.

220 Tons, Hastings, Neb., Central Nebraska Power & Irrigation, group 32-G.

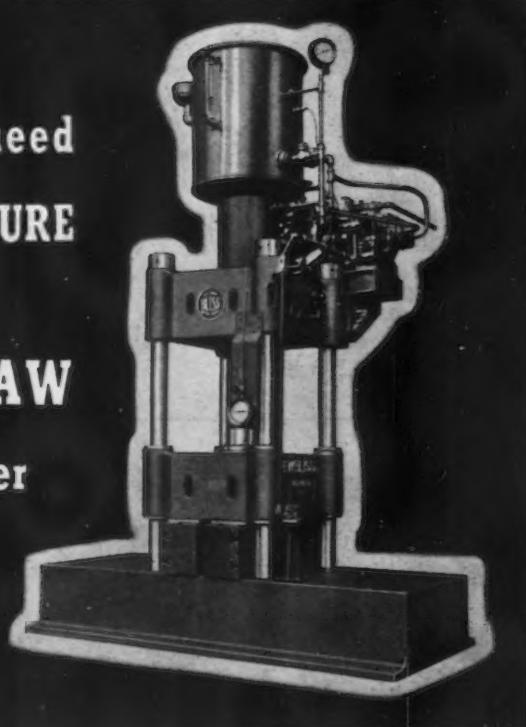
200 Tons, Pekin, Ill., waste treatment plant, Standard Brands.

170 Tons, San Francisco, Alcatraz Island shop; bids April 28.

140 Tons, Manitowoc, Wis., sewage plant.

100 Tons, Clarksville, Mo., upper guard wall for lock and dam No. 24, Mississippi River, bids May 9.

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. . . GREAT BRITAIN . . .

English mills buying ingots from Continent . . . Steel business increasing.

LONDON, April 25 (*By Cable*)—The forthcoming budget and the continued political uncertainties are not impeding British iron and steel activities. Though governmental demands are absorbing large quantities, commercial requirements are increasing, especially with a big revival in shipbuilding. A shortage of ingots and semi-finished steel, despite the increased output, is now to be augmented by continental imports. Further substantial air raid shelter orders have been released and hence makers are fully employed for a long time ahead.

The scrap position is still tight and there is little indication of nearby easing.

Germany has received an order amounting to more than £2,000,000 for a naval arsenal in Turkey.

The Continent reports a much improved demand, with consumers hurrying to place orders in fear of supply difficulties if the international situation gets worse. Price concessions are much less freely obtainable and may soon disappear. Scandinavia, Holland, Dutch East Indies, South America and the Far East are good buyers, but the United Kingdom has placed the largest business.

There is a strong demand for tin plate, home consumers being especially active, but export business is hampered by restriction permits under the quota arrangement. As from May 1, for a period of two months, the maximum output any plant may produce is raised from 60 to 70 per cent.

United Kingdom March imports of all kinds amounted to 102,500 tons, of which 8500 tons was from the United States. March exports of tin plate totaled 21,700 tons; black sheets, 5800 tons; galvanized sheets, 16,500 tons. The total for all kinds was 168,000 tons. Scrap imports amounted to 5800 tons and exports 10,000 tons.

. . . CANADA . . .

Business showing improvement, both domestic and export.

TORONTO, April 25—New business is appearing in better volume in the Canadian iron and steel markets. While a large part of the backlog of Canadian companies are for war materials, domestic demand for iron and steel supplies is furnishing much of the spot business. Dominion Steel & Coal Corp. is reported to be operating at 80 per cent. This company has closed large contracts for steel with British steel interests and officials state that additional contracts are pending. The company's iron mines at Wabana also are maintaining full time production with shipments to Great Britain and other European countries, including Germany, totaling approximately 1,000,000 tons a year. Algoma Steel Corp., Sault Ste. Marie, Ont., has put its new tin plate mill on regular production and will furnish Canadian Can Co. with tin plate on a contract covering the next five years.

Pig iron sales are gaining steadily. It is expected that melters on the Great Lakes soon will be placing large orders for iron. Producers are in a position to give quick delivery from stock piles. It is understood that additional blast furnaces soon will be blown in, one or two at the Sydney works of Dominion Steel.



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Imports at Philadelphia

PHILADELPHIA—The following iron and steel imports were received here during the past week: 116 tons of ferromanganese from Yugoslavia and 100 tons of ferromanganese from Germany; 8 tons of steel bands and 55 tons of structural shapes from France; 56 tons of steel bands, 40 tons of steel bars and 193 tons of structural shapes from Belgium.

Porcelain Enameling Products Gain

CHICAGO—Value of shipments made in February by 99 manufacturers of porcelain enameled products was \$2,648,783, a gain of 11 per cent over the comparable figure for January, \$2,383,192, according to the census bureau.

Forum Reflects Progress in Machine Tool Electrification

(CONTINUED FROM PAGE 55)

has been advanced that industry buys machine tools in large quantities to reduce costs, thereby eliminating jobs. However, the machine tool itself is in my opinion a minor contributor to this particular condition, if the condition really exists.

"The product engineer is continually redesigning his product for the purpose of increasing its efficiency, reducing cost or building into it greater sales appeal. In this redesign, one of the major requirements is to build a better product for the same money or an equivalent product for less money. Naturally the equipment and tool engineer is called into the picture to make his contribution to meet these requirements. . . .

"Our engineers may redesign our motors, changing some part so that instead of it being machined on a turret lathe, it can be produced more economically on a multiple-spindle screw machine. Many examples of this kind could be given because the design engineer is continually improving his product to make it more efficient and to increase sales. The purchase of equipment to produce it may be only incidental."

Increased competition changed the selling pattern in the automotive industry just as it is changing the designing and selling pattern of other machine manufacturers, said Herbert Rosengren, design consultant, American Machine & Foundry Co., in speaking on "The Styling of Special Machinery." We have a right to assume a certain high level of perfection in any kind of a mechanical device, he said. It is not enough to claim now that a machine functions; it must also help to sell itself.

The consuming public has been educated to look for and to demand style in consumer articles, but because the public does not buy them there must be some other reason for the styling of special machines. The most logical reason for it, said Mr. Rosengren, is that we are all susceptible to good design, for our daily contact with good design in consumer articles has created an awareness; we do not demand styled industrial equipment at first, but once it is given to us at no extra cost we come to like it and then to demand it.

In another part he said: The imitative and not always logical designers of the past applied scroll work, gingerbread and non-functional elements in an attempt to mask function. Today there is danger of doing the same thing. We find aerodynamic streamlining applied to stationary objects, heating units that look like radios, radios that look like ventilators, motor cars that are inadequately streamlined for road travel with the appearance of de-winged strato-liners. Design the machine to do the work expected of it, and style it to create a more ready acceptance in the field for which it is intended, said Mr. Rosengren in a later part of his address. The stylist analyzes the appearance requirements of the field, and asks no more of design and fabricating departments than can be given without penalty to operation and cost.

Typical styling problems in the de-

velopment of a new design were illustrated in connection with bakery mixing and other machines built by the American Machine & Foundry Co., machine tools built by the Ingersoll Milling Machine Co. and the Fellows Gear Shaper Co. and bottle-cleaning machines by the Pneumatic Scale Corp.

In conclusion, he said in part:

"It is no longer an acceptable practice to design a machine and then hang on electrical equipment and wiring, and to call in the tin knocker when the machine is ready for shipment to apply crude safety guards. The mechanical design, the electrical equipment, and the non-functioning details of finish and guards must all be carefully planned and coordinated before the machine is put into metal. The stylist assists in this coordination."

Gearmotors Applicable to Machine-Tool Use

Although design engineers in a wide variety of industries have already realized savings in money and space by the application of a gearmotor as a main or auxiliary drive, the gearmotor is still in its infancy, said C. B. Connell, application engineer, West-

(CONTINUED ON PAGE 84)

AN innovation in school building construction is this Girardville, Pa., high school. Acknowledged as the world's first all-porcelain school, this structure is finished in white and dark blue and is trimmed with stainless steel. The enameling for the project was done by the Enamel Products Co., Cleveland, on 18 gage Toncan iron enameling sheets, a product of Republic Steel Corp. Among the advantages claimed for this type of construction are a permanently attractive finish, low weight per unit of exterior surface and low maintenance costs through the elimination of painting. Cost is said to compare favorably with other types of construction.



U. S. Steel Corp. Opens Chicago Office; G. Cook Kimball Promoted

CHICAGO—At a luncheon this week in Chicago, Benjamin F. Fairless, president, United States Steel Corp. of Delaware, announced the establishment of offices in Chicago, and the election of G. Cook Kimball, executive vice-president, Carnegie-Illinois Steel Corp., to executive vice-president of the Delaware Corporation. Prior to this move the only Delaware company officer in Chicago was A. C. Wilby, assistant to vice-president, legal, public and industrial relations.

Before Mr. Wilby's advancement from his position as manager of Chicago district public relations of Carnegie-Illinois, only subsidiary company officers were located in this city. Recognition by the parent company of the importance of the Chicago district and its future is the obvious explanation of this unexpected action. The mills included in the Chicago district now possess over 20 per cent of the country's theoretical ingot capacity, as compared with slightly more than 24 per cent for the Pittsburgh plants. The corporation itself boasts of the world's largest steel works and the world's largest sheet and tin mills, both operated at Gary by Carnegie-Illinois Steel Corp.

High Officials Attend

All of the high officials and directors of the Delaware corporation attended the luncheon, to which had been invited several hundred civic and business leaders. Heading the steel company executives were Benjamin F. Fairless, president; William Beye, vice-president, legal and industrial relations; M. D. Howell, vice-president, financial, secretary and treasurer; H. L. Hughes, vice-president, special duties, New York; Walther Mathesius, vice-president, operations; C. V. McKaig, vice-president, sales; Thomas Moses, vice-president, raw materials; C. H. Rhodes, vice-president, purchases; and R. E. Zimmerman, vice-president, research and technology.

Short talks on the past history and potentialities of the steel industry in the Chicago district were given by Mr. Fairless, E. R. Stettinius, Jr., chairman, E. M. Voorhees, chairman of the finance committee, and Mr. Kimball.

Mr. Kimball, who has been connected with United States Steel subsidiary companies since 1901, is well known in Chicago where he has main-

tained his executive offices for many years. His first job was in the engineering department of the American Tin Plate Co., beginning a year after his graduation from Harvard. From 1905 to 1931 he served as chief engineer of the American Sheet & Tin Plate Co., and in the latter year was made vice-president and a director of



G. C. KIMBALL

the company. He also is a director of Carnegie-Illinois Steel Corp., president of Illinois Manufacturers' Association. Mr. Kimball is a member of the American Iron and Steel Institute, the Harvard Engineering Society, and the Chicago, Commercial, Midday, Old Elm, Saddle & Cycle, Casino, and Harvard clubs of Chicago.

Steel Institute Program Announced

LEADERS of the steel industry will be the speakers at the 48th general meeting of the American Iron and Steel Institute, to be held Thursday, May 25, at the Waldorf-Astoria, New York.

The program includes a morning session, an informal luncheon, a technical session in the afternoon, and a banquet in the evening. Attendance at all meetings will be restricted to individual members of the institute.

At the morning session, T. M. Girdler, chairman of Republic Steel Cor-

poration, and president of the institute, will preside, and will deliver the opening address. The other speakers at this session will be B. F. Fairless, president of United States Steel Corp., and Arthur Roeder, chairman of the Colorado Fuel & Iron Corp.

Charles M. White, vice-president of Republic Steel Corp., will preside at the technical session, at which four addresses will be made on various phases of steel production.

Isaac Harter, executive vice-president of the Babcock & Wilcox Tube Co., will discuss "The Metallurgy and Technique of Welding." James E. Lose, vice-president of Carnegie-Illinois Steel Corp., will talk on "Problems in the Manufacture and Use of Steel in the United States," while James Henderson, deputy-chairman of the Appleby-Frodingham Steel Co., Ltd., London, England, will discuss "Problems in the Manufacture and Use of Steel in Great Britain."

A. O. Smith Announces New Pipe Process

THE A. O. Smith Corp., Milwaukee, is now a full-line manufacturer of oil well casing, with a complete range of A. P. I. standard sizes down to 5½ in. in outside diameter and in wall thicknesses to meet practically any casing need. Smith casing is now available in four grades including a new super yield casing, with a minimum yield point of 105,000 lb. per sq. in., and made in the smaller sizes for extremely high collapse pressures. "It is the first standard casing with such high physical strength," according to the company statement, "and it offers new economy with safety, particularly for deeper holes."

Involving radically new methods of manufacture, the new small sizes, like all Smith casing, are made from rolled steel plates. This permits thorough examination of the steel before manufacture and assures uniform wall thickness. It is produced in accordance with A. P. I. standards. The new sizes are manufactured in average lengths of 50 ft., thus shortening the running time for the strings by requiring fewer joints. Already a considerable quantity has been successfully set in the field, the company says.

A comprehensive book, describing the results of recent Smith studies and tests on casing, is now under preparation and will be ready for distribution in the near future.

"Defense" Industries Taking Only 20% Of Machine Tools, Association Is Told

CHICAGO—Machine tool orders from aircraft builders, shipyards and Government departments, or what might be called the defense group, accounted for less than 20 per cent of the total orders reported in 1938, according to Mrs. F. F. Selbert, secretary, National Machine Tool Builders' Association, in her address on the outlook for the industry before the 37th spring convention of the association held this week in Chicago.

Mrs. Selbert believes a large part of the production facilities of the metal working and other industries might be called upon to satisfy Federal needs, in case of emergency, but for the remainder of 1939, she does not consider the increase in demand from this direction likely to absorb more than a reasonable proportion of total output.

Most Important Group

The most important domestic group to machine tool builders, Mrs. Selbert showed, is a group of industries which have taken from 70 to 75 per cent of the total machine tool volume in the best years of the past five, and never less than 58 per cent.

Included in this group are makers of motor vehicles, electrical equipment, agricultural implements, engines, pumps, conveyors, food and canning machinery, printing machinery, foundry equipment, and the large group which would fall in the "all others" classification.

The group of industries least affected by Government funds, and which feels most the scarcity of new private investment capital, includes construction and mining, office equipment, railroad equipment, textile machinery, steel mills and forge shops. In the best year these industries bought only 14 per cent of the total and dropped to 6½ per cent in the last months of 1938.

Depends On Exports

The high volume of foreign orders is of grave concern, Mrs. Selbert said, not so much because of the amount of business from abroad, but because domestic interest was so slight in 1938. The immediate future trend of foreign demand is obscure but it is certain, Mrs. Selbert said, that should this de-

mand be suddenly curtailed while conditions here remain so unstable, machine tool builders would be forced to develop new sources of domestic orders if the present employment rate were to be maintained.

Reviewing the general situation, Mrs. Selbert could see no indication that the current slack in business would develop into more than a mild recession of three or four months' duration. Referring to the index of machine tool orders, she expects it to recede from the March figure of 107 for domestic orders for a few months and then strengthen as manufacturing picks up. By the use of charts, Mrs. Selbert showed that machine tool orders follow manufacturing activity up and down. Regardless of the condition of the country's manufacturing facilities, she said, needed replacements rarely are made except when the manufacturers order books are filling up.

Running Down Hill

The average this year should be well above that of 1938, Mrs. Selbert continued, the extent of the increase depending on "the diligence of the machine tool industry in selling users production and profits. It is a fact that the production equipment of this country has for 10 years been running down hill. The major task of this industry is to convince the manufacturers of the country that the way to profits lies in the reversal of this trend. To tool up the whole country for profit and full employment, machine tools must be bought in volume sufficient not merely to meet the bare needs of today, but to repair the damages of 10 years of progressive impairment of its capital facilities."

At the opening session of the convention, Wendell E. Whipp, president of the association and of the Monarch Machine Tool Co., Sidney, Ohio, commented on the constant changes and research necessary in the machine tool industry to enable other manufacturers to proceed with advancements in their own fields. Because of this fact, Mr. Whipp regards the machine tool industry as "America's fastest moving industry."

Recognition of the fact that "we cannot regain prosperity by spending," was cited by Mr. Whipp, as he went

on to point out that the "traditional American method . . . is so to improve manufacturing costs as to reduce prices to the consumer.

"We can help," Mr. Whipp said, "to make clear to the public . . . the fact that both maximum employment for workers and sure profits for employers, depend upon the further mechanization which brings better products to more people at lower prices. . . . We must bring home to our friends in the metal working industry a new realization of the tremendous possibilities of increased earnings that lie in the installation of improved machinery equipment."

Concluding his remarks, Mr. Whipp quoted John H. Van Deventer, editor of THE IRON AGE, as follows: "The traditional American system of enterprise pins the responsibility for results right down to individuals, not to groups, masses or classes. This theory of getting the most and best out of every man in an organization is the fundamental principle of successful business. It means all shoulders to the wheel, pushing as hard as they can, and pushing all the time."

Economy in Set-up Time

In his remarks before the meeting, Tell Berna, general manager of the Association, pointed out that refinements in cutting speeds and feeds have about exhausted the possibilities of modern cutting tools. There is still ample room, however, for economy in reducing set-up time in many types of machine tools, he said. This depends largely on the skill and resourcefulness of the tool engineer and the superintendent, but the machine tool builder may also lend effective cooperation in reducing the time required in setting up work for the machine.

John Abbink, president and general manager, Business Publishers International Corp., discussed barter trade with South America and how it might be overcome. At the luncheon Monday noon, Russell T. Kelley, president, Russell T. Kelley, Ltd., and a director of the Canadian Chamber of Commerce, told of trade conditions in Canada.

At the afternoon session, Monday, J. Y. Scott, vice-president, Van Norman Machine Tool Co., spoke on

"Profit Engineering," and Tell Berna read the paper on "Electrical Motor and Control Application to Machine Tools," prepared by B. P. Graves, director of design, Brown & Sharpe Mfg. Co., who was unable to be present.

Quick Learners Needed

The report of the association's Committee on Industrial Training was presented by Everard Stubbs, factory manager, the Fellows Gear Shaper Co. The need today, Mr. Stubbs reported, is for men who will be quick to learn about new mechanisms, who are able to machine a large variety of parts with fewer jibs and simpler equipment and to change over more frequently for smaller quantities than in past years.

A survey showed that 27 member companies of the association have 74.6 per cent of skilled men with from three to four years' practical training. The number of men now in formal three or four year courses in these plants averages 7 per cent of the total skilled force. Companies most active in industrial training find that 10 per cent is in most cases the maximum proportion of skilled forces that can be enrolled in a three or four year course, because of business fluctuations.

William E. Kelly, president, Machinery and Allied Products Institute, told of some of his institute's activities.

Planning in advance for the emergency of war and deciding what tasks would fall to members of the association was outlined by Charles J. Stilwell, vice-president, the Warner & Swasey Co. The concluding paper was presented by J. Carlton Ward, Jr., general manager, Pratt & Whitney Division, United Aircraft Corp., who told what the industry might expect of airplane engines of the future.

J. & L. Cuts Loss In First Quarter

JONES & LAUGHLIN STEEL CORP., Pittsburgh, has reported a net loss of \$376,525 for the first quarter of 1939 compared with a net loss of \$1,147,506 in the first quarter of 1938.

Truscon Mesh Plant May Operate by May 1

The wire mesh plant of the Truscon Steel Co., now under construction at the Gadsden, Ala., works of the Republic Steel Corp., is expected to begin production about May 1.

Coal Strike a Political "Squeeze", Thomas, Koppers Official, Says

PITTSBURGH—Practically all steel companies in the country have instituted precautionary measures to conserve coal supplies. In the majority of cases the action involves either the banking of blast furnaces or the curtailment of pig iron production on furnaces still in blast.

Major concern of producers now is to earmark substantial coal supplies in case the coal mine dispute lasts long enough to force drastic curtailment in pig iron or steel production. The reserve supplies now being conserved would be used to effect an immediate step up in production when and if the deadlock between the miners and operators is broken, since it is estimated here that it will take from a week to 10 days to get coal moving from the mines to the consumer following an agreement between operators and union officials.

So far actual raw steel production has not been affected by the coal situation nor has there been an influx of orders for steel products from consumers who fear a possible shortage. There are isolated cases where steel mills are depleting their inventories of semi-finished steel, thus taking some load from the open hearth furnaces. This move has not yet become general.

Industrialists here share the view of P. C. Thomas, vice-president, Koppers Coal Co., who said in referring to government mediation efforts:

"We have nothing to mediate. You can't mediate the question of the closed shop. This thing is fundamental. The industry is not going to be thrown into chaos over a political fight if we can help it. The whole thing means that the public generally, the city of New York and the coal operators are being made the victims of John L. Lewis' efforts and William Green's efforts to have a chance to organize. To us it's a squeeze game. The core of the situation is political, not economic."

COAL STRIKE ADDS TO UNEMPLOYMENT

CLEVELAND—Effects of the coal strike are becoming more apparent throughout Ohio. Large industrial plants in general have ample supplies but wherever possible are conserving fuel. Blast furnace and coke

oven operations are being held to a minimum.

Railroads have curtailed operations. The New York Central closed its Collinwood shops, temporarily putting 800 men out of work. At Columbus, 1300 railroad employees were laid off last week. The Chesapeake & Ohio, an important coal carrier, moved only 572 cars of coal during the first three weeks of April, compared with 33,000 in the same period last year.

Some of the coal accumulated on Lake Erie docks prior to April 1 has been moved back downstate to industrial centers in need of fuel. About 5000 tons was carried back to Youngstown from Ashtabula for steel works use. At Lorain a cargo of 11,000 tons dumped one month ago into the steamer "E. T. Weir," was unloaded after being sold to the Baltimore & Ohio railroad.

U. S. Steel Profits \$660,551 in 1st Period

NET earnings of the United States Steel Corp. in the first quarter of the current year were \$660,551 after depreciation, interest and taxes, according to an announcement by E. R. Stettinius, Jr., chairman of the board. This compares with \$4,432,914 in the last quarter of 1938 and a deficit of \$1,292,151 in the first quarter of 1938. The regular quarterly dividend of \$1.75 per share on preferred stock was declared by the board of directors.

Mr. Stettinius said, "While the rate of operations during the quarter, as measured by production and shipments of finished steel products, showed a slight improvement over the fourth quarter of 1938, the earnings for the quarter reflected the generally lower average level of prices realized without proportionately compensating adjustments in labor and material costs, which continue at the high levels of last year."

The quarter's shipments amounted to 2,235,209 tons, or 50.2 per cent of capacity, as compared with 2,037,144 tons in the previous quarter and 1,565,244 in the March quarter of 1938. Production in the first three months of this year averaged 51.7 per cent of capacity. Mr. Stettinius credited the less-than-normal improvement in the quarter's shipments to the uncertain foreign conditions.

American Iron and Steel Institute's Report of Pig Iron and Ferroalloys Output in 1938

PRODUCTION OF PIG IRON AND FERRO-ALLOYS

	1934	1935	1936	1937	1938
PIG IRON:					
Pennsylvania	4,244,566	5,479,792	9,102,875	11,371,238	4,835,969
Ohio	4,207,944	5,634,530	7,206,655	7,903,944	4,210,514
Indiana, Mich.	2,184,546	2,898,478	4,168,299	4,722,316	2,347,315
Alabama	1,171,650	1,297,960	1,998,212	2,580,674	2,023,268
Illinois	1,269,154	2,003,388	2,917,016	3,426,116	1,656,591
Mass., New York	1,053,257	1,415,755	2,220,522	2,843,286	1,303,217
Md., Va., West Va., Ky., Tenn.	1,318,964	1,781,171	2,102,106	2,531,457	1,813,352
Minn., Iowa, Col., Utah	226,808	269,686	500,862	750,565	355,844
Total	15,676,889	20,780,760	30,216,547	36,129,596	18,546,070
FERRO-ALLOYS:					
Pennsylvania	164,776	219,947	330,463	437,315	164,899
New York, N. J.	140,711	195,281	243,176	259,583	190,430
Ohio, Ia., Col.	116,402	113,147	164,173	172,379	152,748
Va., West Va., Ala., Tenn.	39,795	63,564	74,828	128,404	106,714
Total	461,684	591,939	812,640	997,681	614,791
Grand total	16,138,573	21,372,699	31,029,187	37,127,277	19,160,861

PIG IRON MADE FOR SALE IN 1938

States	Basic	Besse. & low-phos.	Foundry	All Other	Total
New York	50,028	32,146	190,983	116,482	389,639
Pennsylvania	193,813	75,006	85,275	68,269	422,363
Md., W. Va., Ky., Ala., Tenn.	209,981	3,760	816,134	11,330	1,041,205
Ohio	27,338	20,886	134,944	284,723	467,891
Indiana, Ill.	103,546	19,887	50,834	388,372	562,639
Mich., Ia., Col., Utah	631	70,001	555	71,187	
Total	585,337	151,685	1,348,171	869,731	2,954,924

HALF-YEARLY PRODUCTION OF PIG IRON AND FERRO-ALLOYS

States	BLAST FURNACES (a)			PRODUCTION		
	In blast June 30, 1938	Dec. 31, 1938		First 6 months 1938	Second 6 months 1938	Total 1938
	In	Out	Total			
Mass.	0	0	1	1		
New York	5	8	16	572,599	730,618	1,303,217
Penna.	17	25	45	70	2,122,809	
Maryland	4	5	1	6		
West Va.	1	1	2	3		
Kentucky	1	1	1	2		
Tennessee	1	0	1	1		
Alabama	6	15	4	19	870,203	1,153,065
Ohio	16	27	19	46	1,601,474	2,609,040
Illinois	4	9	14	23	708,731	947,860
Indiana	5	8	11	19	964,028	1,383,287
Michigan	4	5	3	8		
Minnesota	1	1	1	2		
Iowa	0	0	0	0		
Missouri	0	0	1	1		
Colorado	1	1	1	2		
Utah	1	1	0	1		
TOTALS:						
Pig iron	67	107	113	220	7,778,964	10,767,106
Ferro-alloys						
Blast furnaces	6	9	7	16	196,688	170,250
Electric furnaces					128,369	119,484
Grand total	73	116	120	236	8,104,021	11,056,840
(a) Completed and rebuilding blast furnaces.						

HALF-YEARLY PRODUCTION OF PIG IRON BY GRADES AND FERRO-ALLOYS BY KINDS

BASIC PIG IRON

States	First 6 months 1938	Second 6 months 1938	Total 1938
New York	312,450	536,317	848,767
Pennsylvania	1,551,611	2,059,620	3,611,231
Maryland, West Virginia, Ky., Ala.	1,152,985	1,562,606	2,715,591
Ohio	875,588	1,557,320	2,432,908
Indiana, Illinois	997,350	1,557,012	2,554,362
Michigan, Minnesota, Colorado, Utah	272,039	453,181	725,220
Total	5,162,023	7,726,056	12,888,079

BESSEMER AND LOW-PHOSPHORUS PIG IRON

States	First 6 months 1938	Second 6 months 1938	Total 1938
Pennsylvania	487,761	557,903	1,045,664
New York, Md., West Va., Ala.	145,576	229,098	374,674
Ohio	534,173	732,919	1,267,092
Indiana, Illinois	156,017	210,255	366,272
Total	1,323,527	1,730,175	3,053,702

FOUNDRY PIG IRON

States	First 6 months 1938	Second 6 months 1938	Total 1938
New York, Pennsylvania	167,625	156,569	324,194
Maryland, Ky., Tenn., Ala.	361,867	476,609	838,476
Ohio	71,627	79,621	151,248
Indiana, Ill., Mich., Col., Utah	147,117	109,547	256,664
Total	748,236	822,346	1,570,582

MALLEABLE PIG IRON

States	First 6 months 1938	Second 6 months 1938	Total 1938
New York, Pennsylvania	138,738	61,571	200,309
Ohio	117,714	232,624	350,338
Indiana, Illinois, Michigan	270,947	180,841	451,788
Total	527,399	475,036	1,002,435

FERRO-ALLOYS BY KINDS

FERRO-ALLOYS BY KINDS	For sale	For maker's use	Total
Ferro-manganese and spiegeleisen	154,938	135,852	290,790
Ferro-silicon	150,704	131,817	282,521
Other ferro-alloys	19,415	22,065	41,480
Total	325,057	289,734	614,791

PRODUCTION OF PIG IRON AND FERRO-ALLOYS IN 1938

(For sale and for maker's use)

	For sale	For maker's use	Total
PIG IRON:			
Basic	585,337	12,302,742	12,888,079
Bessemer and low-phosphorus	151,685	2,902,017	3,053,702
Foundry	1,348,171	222,411	1,570,582
Malleable	857,159	145,276	1,002,435
Forge or mill	687		687
White and mottled, direct castings, etc.	11,885	18,700	30,585
Total	2,954,924	15,591,146	18,546,070
FERRO-ALLOYS:			
Ferro-manganese and spiegel	112,393	178,397	290,790
Ferro-silicon	282,162	359	282,521
Other ferro-alloys	40,957	523	41,480
Total	435,512	179,279	614,791
Grand total	3,390,436	15,770,425	19,160,861

(CONTINUED FROM PAGE 83)

inghouse Nuttall works, in a paper on "Garmotors to Simplify Design Problems."

The modern equipment used in the manufacture of gearmotors was illustrated and described. It included a gear tooth lead checking machine, contour and tooth spacing machines, capable of checking tooth to tooth spacing and tooth contour to within 0.0001 in. Also a rotary type machine for shaving gear teeth after cutting. Gears thus finished will check within a few ten thousandths for tooth spacing, lead and contour. Certain applications of gearmotors demand gears within these limits to meet sound level requirements.

A number of gearmotor applications were described and illustrated. They included a metal cutting saw, a pipe threading and cutting machine, a group of punch presses, and cooling towers. For the last named, the sound level of the gearing must not exceed that of the motor.

At the same session, W. A. Maddox, welding supervisor, Cincinnati Milling Machine Co., addressed the forum on the subject of "Welded Fabrication as an Aid to Electrification of Machine Tools."

Fractional horsepower motors and some special integral horsepower types were discussed in a brief but interesting paper on "Small Motors in Machine Tool Applications," by L. R. Botsai, sales manager, small motors division, Westinghouse Lima, Ohio.

A new engineering laboratory has been completed at the Lima plant, for testing materials and products, and making life tests on motors applied to customer's devices. A new sound-proof test room permits maintaining the noise level at more than 40 decibels below ambient, an important feature since specifications for sound levels are becoming increasingly rigid.

Application of fractional horsepower motors to machine tools is divided into two general classifications: first as main drives to bench lathes, small drills, grinders, etc., and second, to auxiliary drives such as coolant and lubricating pumps, clamps, elevating devices, traverse motions and auxiliary tool drives.

Cost Comparisons Between Electric and Other Drives

Comparative costs of electrical, hydraulic and mechanical drives were discussed in a paper by R. S. Elberty, electrical engineer, Landis Tool Co. On machine tools, electric drives show many advantages, such as flexibility and ease of control, he said, and in applications wherein the merits of electric drives are outstanding, cost should be a secondary consideration. However, on many machine tool applications, there is little difference between drive alternatives, and cost then becomes a determining factor in choosing between them.

Reduction of electrification costs by the simplification of drives was discussed by W. E. Happel, electrical en-

gineer, Landis Tool Co., in a paper on "Reduce the Cost of Electric Drives." Cases of savings by simplification, cited by Mr. Happel, included the redesign of a complicated semi-automatic machine, and the application of a motor brake to a small machine.

An interesting study of reversing motor duty was presented at the same session in papers by R. E. Toomey, industrial motor engineering, and T. R. Lawson, Westinghouse motor division sales.

Electrification of Large Machine Tools

What is being done electrically to make large machine tools more simple and easier to operate was outlined by G. A. Spohn, electrical engineer, General Machinery Corp., in an interesting address on "Progress in Electrification of Large Machine Tools." Machines pictured during the discussion included boring mills, a plate planer and scarifying machine featuring unusual ease of operation, and a large lathe showing a simple method of drive with plugging control.

In a paper on "The Flexibility of Modern Electric Drives," G. E. Hieber, chief engineer, Cincinnati Planer Co., described the advantage of splitting up the power requirements and using multiple motors on planers, boring mills, and planer-type millers built by his company. The features and advantages of a new planer-type miller with individual drive to each spindle were described and illustrated. Another example of modern motorizing was a frog and switch planer, and an outstanding application of electricity to accomplish to better advantage a function previously performed mechanically is the company's new planer feed.

An empirical method for selecting motors was described and illustrated by W. F. Ridgway, development engineer, Ingersoll Milling Machine Co., which manufactures custom-built machine tools ranging from a small machine for slotting piston rings up to a 250-ton general purpose machine with capacity for milling parts too large to be shipped on a flat car.

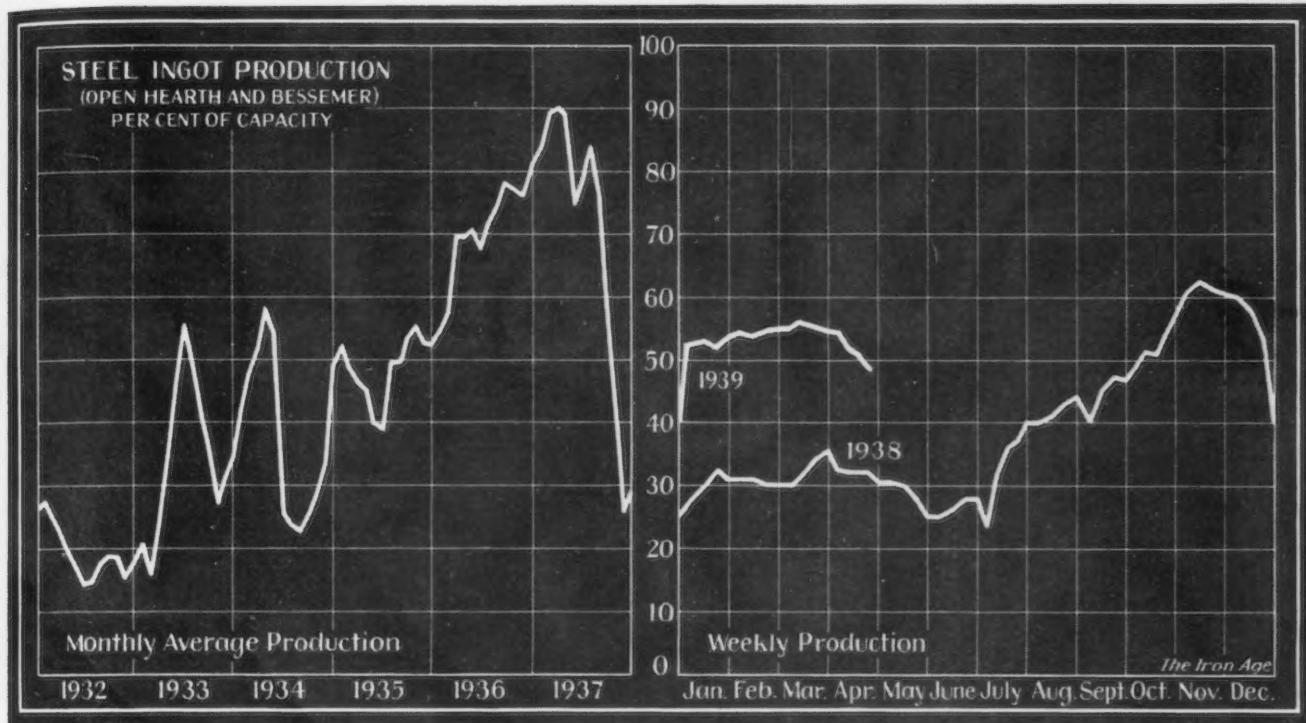
G-E Sales Rise 5% During First Quarter

GENERAL ELECTRIC CO. sales billed during the first quarter of 1939 amounted to \$68,537,269, compared with \$65,086,557 during the same quarter last year, an increase of 5 per cent.

AT Plymouth, world's biggest auto assembly plant, the control of the flow of parts and materials to the assembly line is handled through this "dispatcher's office." From this point issue the telautograph orders and "track sheets" which guide assemblies. The tally board in the foreground has hundreds of up-pointed spikes on which colored washers indicate the number of incoming bodies. A plain washer indicates one body, a red one means five, blue, ten and yellow, twenty. Through the system in this office it is possible to keep track of the 12,000 or 13,000 possible automobile combinations which might be ordered.

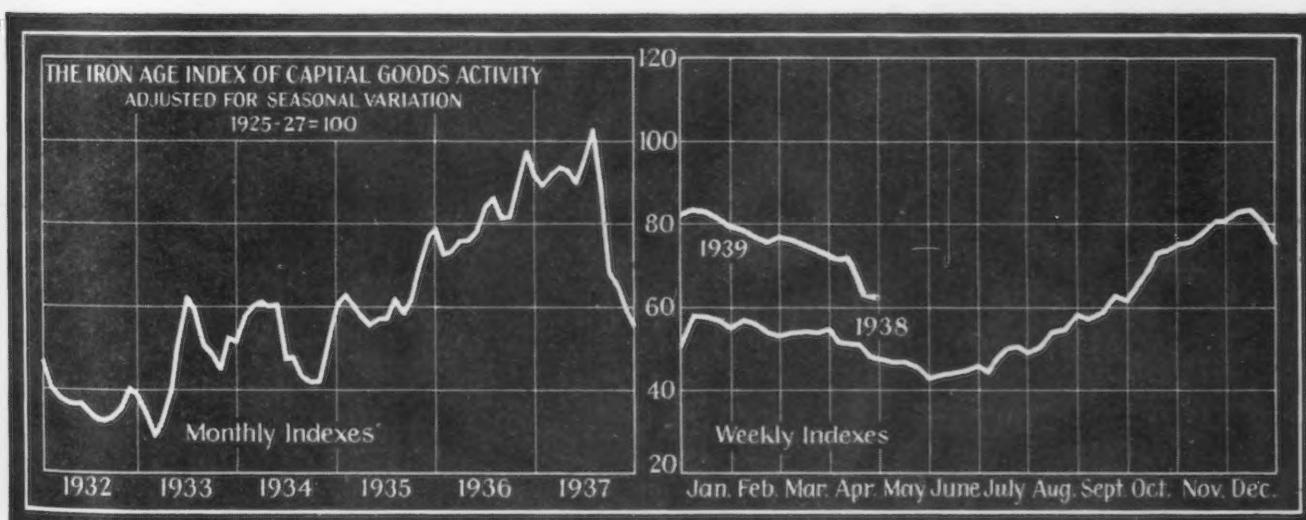


Ingot Production Declines Two Points to 48½%



District Ingot Production, Per Cent of Capacity	Pittsburgh	Chicago	Valleys	Philadelphia	Cleveland	Buffalo	Wheeling	Detroit	Southern	S. Ohio River	Western	St. Louis	Eastern	Aggregate
CURRENT WEEK..	45.0	49.5	38.0	34.0	35.0	41.5	56.0	55.0	43.5	49.0	60.0	41.0	50.0	48.5
PREVIOUS WEEK..	42.0	53.5	42.0	36.0	37.0	47.0	76.0	55.0	46.5	53.5	60.0	46.5	50.0	50.5

Capital Goods Index Continues to Show Weakness



ACTIVITY in the production and distribution of durable goods showed a further decline in the past week, according to THE IRON AGE index, but the current rate is still substantially above the 1938 level at this time of the year. At the end of the past week the index stood at 63.2, down 1.1 point from the preceding week and the lowest since the week of Oct. 1, 1938. The past week's losses were all much smaller than in the previous week, when the coal strike caused the index to drop 6.4 points. One component, the lumber carloadings series, showed a small gain. Construction awards in the week past were \$53,947,000, a drop of 33 per cent from the

preceding week's volume, but 37 per cent above the corresponding week of 1938.

	Week Ended	Week Ended	Comparable Week
Steel ingot production ¹	Apr. 22	Apr. 15	1938 1929
Automobile production ²	72.6	73.9	49.1 127.2
Construction contracts ³	78.3	80.7	70.2 134.8
Forest products carloadings ⁴	49.9	48.1	44.9 125.4
Production and shipments, Pittsburgh District ⁵	51.6	53.9	50.7 123.3
Combined index	63.2	64.3	50.9 127.4

Sources: 1. THE IRON AGE; 2. Ward's Automotive Reports; 3. Engineering News-Record; 4. Association of American Railroads; 5. University of Pittsburgh.

... SUMMARY OF THE WEEK ...

... Coal tie-up a factor in declining operations.

... Orders also dwindling, but steel companies are conserving fuel.

... Ingot production down to 48½ per cent; steel scrap composite \$14.33.

THE coal tie-up is having a more marked effect on the steel situation. Steel companies continue to put coal conservation measures into effect. So far the influence on steel production has been small, but in some cases steel companies are dipping into stocks of semi-finished steel and curtailing output of ingots proportionately. A dozen or so blast furnaces have been blown out or banked, some to conserve coke and coal, others because of dwindling demand for steel products.

Industrial users of steel are not increasing their orders because of fear of steel shortage, probably because of the fact that a protracted shutdown at coal mines would affect many consumers of steel as well as the producers. Contrarily, some of the restriction on steel orders has been caused by the coal situation; for example, among the railroads, the New York Central has reduced working forces at some of its shops to skeleton crews. Coal carrying roads are suffering large losses in revenue. Some of the coal accumulated on Lake Erie docks for shipments to upper lake ports has been moved back to industrial plants in Ohio and elsewhere. A cargo of 11,000 tons that had been loaded on a lake ore vessel was unloaded and sold to a railroad.

Steel ingot production has declined two points this week to 48½ per cent and may go slightly lower during May under the influence of declining demand and the restrictions on output dictated by coal economy. Only at Pittsburgh has there been a gain which brings the average rate there up three points to 45 per cent, but such a fluctuation is likely to occur frequently while operations are being kept in close alignment with orders. In the Chicago district, on the other hand, there was a decline of four points to 49½ per cent. The sharpest loss is in the Wheeling-Weirton district, which is down 20 points to 56 per cent. Losses have also occurred in Eastern Pennsylvania, Buffalo, Birmingham, Cleveland-Lorain, Youngstown, Southern Ohio and St. Louis. Two blast furnaces have been taken off in the Chicago district by the Carnegie-Illinois Steel Corp. and two in the Birmingham district by the Tennessee Coal, Iron & Railroad Co.

During April some of the steel companies have been living partly off backlog accumulated in March or earlier, but buying this month has been largely of hand-to-mouth character, indicating that

May output will be sustained only to the degree that consumers and distributors actually need steel for current requirements. Even so, the fact that inventories are generally low may serve as a cushion against a sharp decline. Before the end of May some expected orders from automobile companies for 1940 models will be of especial help to sheet and strip mills, which have been hardest hit. Structural steel and tin plate mills are in the best position, tin plate production having risen two points to 65 per cent.

As is usual in a time like the present, steel buyers are looking sharply for concessions in prices, but excepting some isolated cases prices are holding fairly well, one reason being that few buyers have attractive tonnage to offer. No real test of prices is expected until the automobile companies come into the market for steel for 1940 cars. Another aspect of declining demand is a lengthening of deliveries on some products owing to intermittent operations of mills.

In the midst of general uncertainty which the steel industry attributes to inaction at Washington as much as to war fears, there are some branches of the steel consuming industry which are maintaining undiminished activity. Among these are manufacturers of household equipment, tractors, road machinery, tin cans and machine tools. The automobile industry, although holding to a steadily good volume of assemblies, has become a relatively unimportant factor in steel at the moment. Construction work, being stimulated by Government spending, is a main support of steel production.

Fabricated structural steel lettings in the week were just under 20,000 tons and are supplemented by new projects out for bids amounting to more than 43,000 tons, highest total since early December. Bridges account for a large part of this, one requiring 15,000 tons to be built over the Susquehanna River at Havre de Grace, Md., and one of 13,000 tons over the Potomac River at Ludlow Ferry, Md. Two others account for an additional 5000 tons. Inquiries for reinforcing steel total 15,600 tons, though orders are low at 4900 tons.

Railroad buying is spotty, but has not disappeared. The Great Northern has ordered 1000 box cars and may buy about 10,000 tons of rails. The Denver & Rio Grande Western is expected to order 550 cars and 100 underframes. Because of an order issued by the Illinois Commerce Commission, the Chicago Rapid Transit Co. will find it necessary to buy 1000 steel cars which, with other improvements, will cost more than \$30,000,000.

SCRAP markets continue to be affected by prevailing uncertainty and lack of mill buying. Declines have occurred in several markets. THE IRON AGE scrap composite price is 9c. lower at \$14.33.

A Comparison of Prices

**Market Prices at Date, and One Week, One Month, and One Year Previous
Advances Over Past Week in Heavy Type, Declines in Italics**

Rails and Semi-finished Steel

	Per Gross Ton:	Apr. 25, 1939	Apr. 18, 1939	Mar. 28, 1939	Apr. 26, *1938
Rails, heavy, at mill.....	\$40.00	\$40.00	\$40.00	\$42.50	
Light rails: Pittsburgh, Chicago, Birmingham.....	40.00	40.00	40.00	43.00	
Rerolling billets: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point.....	34.00	34.00	34.00	37.00	
Sheet bars: Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point.....	34.00	34.00	34.00	37.00	
Slabs: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point.....	34.00	34.00	34.00	37.00	
Forging billets: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham.....	40.00	40.00	40.00	43.00	
Wire rods: Nos. 4 and 5, Pittsburgh, Chicago, Cleveland.....	43.00	42.00	43.00	47.00	
Skelp, grvd. steel: Pittsburgh, Chicago, Youngstown, Coatesville, Sparrows Point, cents per lb.	1.90	1.90	1.90	2.10	

Finished Steel

	Cents Per Lb.:			
Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham.....	2.25	2.25	2.25	2.45
Plates: Pittsburgh, Chicago, Gary, Birmingham, Sparrows Point, Cleveland, Youngstown, Coatesville, Clayton.....	2.10	2.10	2.10	2.25
Structural shapes: Pittsburgh, Chicago, Gary, Buffalo, Bethlehem, Birmingham.....	2.10	2.10	2.10	2.25
Cold finished bars: Pittsburgh, Buffalo, Cleveland, Chicago, Gary.....	2.70	2.70	2.70	2.90
Alloy bars: Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.....	2.80	2.80	2.80	3.00
Hot rolled strip: Pittsburgh, Chicago, Gary, Cleveland, Middletown, Youngstown, Birmingham.....	2.15	2.15	2.15	2.40
Cold rolled strip: Pittsburgh, Cleveland, Youngstown....	2.95	2.95	2.95	3.20
Sheets, galv., No. 24: Pittsburgh, Gary, Sparrows Point, Buffalo, Middletown, Youngstown, Birmingham.....	3.50	3.50	3.50	3.80
Hot rolled sheets: Pittsburgh, Gary, Birmingham, Buffalo, Sparrows Point, Cleveland, Youngstown, Middletown.....	2.15	2.15	2.15	...
Cold rolled sheets: Pittsburgh, Gary, Buffalo, Youngstown, Cleveland, Middle-ton.....	3.20	3.20	3.20	...

On export business there are frequent variations from the above prices. Also in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

The Iron Age Composite Prices

Finished Steel

2.286c. a Lb.
2.286
2.286
2.512

Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strip. These products represent 85 per cent of the United States output.

April 25, 1939
One week ago
One month ago
One year ago

Pig Iron

\$20.61 a Gross Ton
20.61
20.61
23.25

Based on average for basic iron at Valley furnace and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Steel Scrap

\$14.33 a Gross Ton
14.42
15.29
11.92

Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	HIGH	LOW
1939.....		
1938.....	2.512c, May 17; 2.211c, Oct. 18	
1937.....	2.512c, Mar. 9; 2.249c, Jan. 4	
1936.....	2.249c, Dec. 28; 2.016c, Mar. 10	
1935.....	2.062c, Oct. 1; 2.056c, Jan. 8	
1934.....	2.118c, Apr. 24; 1.945c, Jan. 2	
1933.....	1.953c, Oct. 3; 1.792c, May 2	
1932.....	1.915c, Sept. 6; 1.870c, Mar. 15	
1931.....	1.981c, Jan. 13; 1.883c, Dec. 29	
1930.....	2.192c, Jan. 7; 1.962c, Dec. 9	
1929.....	2.223c, Apr. 2; 2.192c, Oct. 29	
1928.....	2.192c, Dec. 11; 2.142c, July 10	

	HIGH	LOW
1939.....		
1938.....	\$23.25, June 21; \$19.61, July 6	
1937.....	23.25, Mar. 9; 20.25, Feb. 16	
1936.....	19.73, Nov. 24; 18.73, Aug. 11	
1935.....	18.84, Nov. 5; 17.83, May 14	
1934.....	17.90, May 1; 16.90, Jan. 27	
1933.....	16.90, Dec. 5; 13.56, Jan. 3	
1932.....	14.81, Jan. 5; 13.56, Dec. 6	
1931.....	15.90, Jan. 6; 14.79, Dec. 15	
1930.....	18.21, Jan. 7; 15.90, Dec. 16	
1929.....	18.71, May 14; 18.21, Dec. 17	
1928.....	18.59, Nov. 27; 17.04, July 24	

... THIS WEEK'S MARKET NEWS ...

STEEL OPERATIONS

. . . Ingot rate drops two points to 48½% of capacity

INGOT production this week is estimated by THE IRON AGE at 48½ per cent, a decline of two points from last week. The erratic character of operations is shown by the fact that the PITTSBURGH rate has advanced three points to 45 per cent, while the CHICAGO rate has declined four points to 49½ per cent. The upward movement at PITTSBURGH is not indicative of a general reversal of the recent downward trend, but is a fluctuation that may be frequent during the nearby period as raw steel output is closely aligned with incoming orders from week to week. At CHICAGO lower steel production is accompanied by the taking off of two blast furnaces, one each at the plants of the Carnegie-Illinois Steel Corp.

The sharpest drop in operations is in the WHEELING-WEIRTON district, which is off 20 points to 56 per cent, bringing this district more nearly in line with other districts. A major share of the reduction is caused by the taking off of two bessemer converters. Other districts to sustain losses in productive activity are EASTERN PENNSYLVANIA, BUFFALO, BIRMINGHAM, SOUTHERN OHIO and ST. LOUIS.

Further moderate contraction in operations is expected in some districts.

NEW BUSINESS

. . . Orders dropping off and prospects are not encouraging

AN analysis at PITTSBURGH covering sales of all major steel products indicates that bookings so far this month are running between 6 and 10 per cent below the corresponding March period. In some divisions, such as flat rolled, the recession of course has been much greater. Despite the possibility of an acute coal shortage resulting in curtailed steel activity, there has been little or no effect on the volume of incoming business. This situation may be due to the fact that steel consumers themselves would be forced to curtail operations at the same time as steel plants if the coal strike should continue. Structural and tin plate specifications continue to be

the major supporting factors in the current market at PITTSBURGH.

Here and there throughout the nation demand from some miscellaneous steel consuming industries is surprisingly good in the face of buying inactivity by such major industries as the automotive and agricultural implement fields, and the railroads.

CLEVELAND and YOUNGSTOWN mills report livelier demand for oil country casing. Tin plate and construction remain active. Sales of barbed wire and fence are holding about even with last month. Manufacturers of some household items requiring strip steel continue busy. In general, orders are individually small.

April sales thus far continue to run behind those of a month ago in the CHICAGO district. Shipments may be compared with March more favorably but they too are dropping off. No prospects, barring war, are seen here that will boost the rate during the next few months. No radical change downward is foreseen either but it is believed that a gradual decline in operations will result through May and June.

None of the major steel consuming channels can be expected to increase their present activity appreciably, according to CHICAGO opinion. They, as well as small buyers and miscellaneous users, are maintaining low inventories and buying for their current requirements only.

It is thought that important buying for 1940 motor cars will not be seen for four to six weeks at least. Several railroads have car programs that may develop during this quarter but nothing is definite. The CHICAGO elevated lines have been ordered to purchase about 1000 all metal cars to replace all existing wood equipment.

Among the most active plants in the CHICAGO area are makers of tractors and road building machinery.

PRICES

. . . Buyers trying to obtain concessions on steel products

BUYERS are in many instances trying to take advantage of the present steel situation to obtain concessions in prices. Thus far it appears that they have been successful only in some isolated cases. Generally, prices are holding to published levels. The tonnages that are being offered are

usually too small to afford a real test of the market, which may not come until automobile companies make purchases in May or June for 1940 models.

PIG IRON

. . . Melters are watching effect of coal strike on situation

THE coke situation is being closely watched by pig iron users, but as yet there has been no buying on the score of possible scarcity of iron later on as most consumers do not believe the coal tie-up will last long enough to create a serious shortage of iron. Some melters have advanced shipping dates of iron on contract, but the tonnage involved in such measures of protection is as yet very small. However, producers of beehive coke have withdrawn prices, though by-product prices are unchanged, as supplies of the latter grade are believed to be equal to about 30 days' requirements in most areas. Some users of beehive coke have been obliged to turn to by-product fuel.

April shipments of pig iron have declined, in some instances rather sharply. CLEVELAND and YOUNGSTOWN furnaces will ship 15 to 20 per cent less this month than last. An exception is the PHILADELPHIA district, where one seller reports April shipments about 20 per cent in excess of those of the same period in March. A merchant furnace, that of the E. & J. Brooke Iron Co. at Birdsboro, Pa., has been blown in, having an adequate supply of coke for an extended run.

While most of the steel companies and independent blast furnace operators have sufficient coal and coke for the next few weeks, a good deal of caution is being exercised in their use, as indicated by the banking of some steel company blast furnaces. The Tennessee Coal, Iron & Railroad Co. has further reduced pig iron production at BIRMINGHAM by banking the Ensley No. 2 furnace this week, reducing the district's total active stacks to 12. Ensley No. 5 furnace was banked a week ago.

The New York State canal was opened officially on Monday. A barge-load of pig iron, already loaded, from the Hanna Furnace Co. at BUFFALO is expected to be the first shipment of the year.

SEMI-FINISHED STEEL

... New business shows a declining tendency

NEW business at PITTSBURGH in the past week was not as active as the previous week. This recession in the volume of new purchases reflects the lower rate of activity at many non-integrated plants. Very little semi-finished is moving at CLEVELAND and YOUNGSTOWN. Demand for sheet bars is particularly weak.

SHEETS AND STRIP

... Trend of orders downward in all districts

NEW business at PITTSBURGH reflects a further decline in the past week. Producers expect little or no change in the present market picture until active buying by automobile companies for 1940 models occurs. Demand from home and electrical appliance manufacturers continues to expand slightly but this volume is not offsetting losses elsewhere. Some last minute wind-up purchases from Detroit are expected to be made this month or early next month, but the amount of steel involved probably will not add greatly to present depleted rolling schedules.

CHICAGO sheet sellers now believe practically all of the 1939 motor car needs have been filled. Orders for 1940 models are not expected for from four to six weeks. Miscellaneous sheet buying is only fair, the low condition of inventories providing the only bright spot.

Manufacturers of some household items continue active with a few other industries, but in general the sheet and strip outlook for the immediate future appears gloomy at CLEVELAND and YOUNGSTOWN, owing to the prolonged absence of major consumers from the market.

In Southern Ohio buying apathy is reflected in a small decline in sheet and strip ordering. Aggregate orders are barely touching 50 per cent as the gradual withdrawal of automotive buying leaves blanks in current order books. Miscellaneous users, particularly household equipment manufacturers, maintain better than average demand, but specialties are without much interest. The galvanized demand is still fair. Consumers' stocks are reported to be low, making the

Market Sidelights

The Bureau of Supplies and Accounts, Navy Department, will open bids on May 4 for 586 tons of shapes, 330 tons of steel bars and strips, and 300 tons of medium steel angles, for four destroyers, two each building at the Charleston, S. C., and Boston Navy yards.

* * *

A second flood scare occurred in the Southern Ohio district the past week. Following heavy rains, the Ohio River rose, causing persons in the flood area to take precautions, but the river stopped after a crest of 58.1 without causing great damage. The Andrews Steel Co. cooled all its open hearths for two days.

* * *

The strike of the teamsters' union in Chicago, which was reported in The Iron Age last week, was settled just before that issue went to press. All projects temporarily halted during the strike for lack of material have been enjoying normal activity since Tuesday, April 18.

* * *

The Warren Foundry & Pipe Corp., Everett, Mass., this month will hang up a new high record on shipments. The foundry is operating five days a week, and has a very comfortable backlog of orders, which insures full time operations for more than two months.

market sensitive to any expansion in user business.

Several sellers in the PHILADELPHIA district, representing large mills, report that the general volume of orders continues to fall off, the decline during the past week being more than 10 per cent in certain instances. Some of the local mills, however, have not been so hard hit, although the district trend is undeniably downward. The market pricewise is steady. The Federal Prison Industries opened bids on Monday involving about 150 tons of hot rolled pickled sheets for cabinets and several tons of hot rolled bars. No disposition of this tonnage has yet been made.

Sheet sales in the NEW YORK area shrank further in the past week as the effects of the domestic coal strikes were added to uncertainties engendered by the situation abroad.

Heavy rains in the ST. LOUIS area have hampered work of repairs on farms, resulting in a light movement of galvanized sheets. With a little sunshine, it is expected that there will be reordering by jobbers.

PLATES

... American Rolling Mill Co. buys 30 barges

THIRTY steel coal barges ordered by American Rolling Mill Co., 10 of which will come from St. Louis Shipbuilding Co. and the remaining 20 from Marietta Mfg. Co., Point Pleasant, W. Va., will utilize approximately 4500 tons of steel. The Marietta company has already completed some work on barges which were being made for stock but which will now be applied against the American Rolling Mill order. It is also expected that American Rolling Mill Co. will place contracts for two towboats soon.

Total incoming orders for CLEVELAND and YOUNGSTOWN plate mills during April apparently will fall considerably short of the March volume. Railroad shops have curtailed their activities sharply due to the coal strike.

Plate sellers in the NEW YORK district are concentrating on the 2500 tons of plates for the 300 Maine Central box cars to be fabricated by the Magor Car Corp. The railroads themselves, in the face of a coal shortage, are curtailing shop operations and are making no commitments for materials.

Associated Piping & Engineering Co., LOS ANGELES, has been awarded contract for fabricated pipe and fittings for Grand Coulee Dam at \$167,600. The bulk of the contract is comprised of fittings.

STRUCTURAL STEEL

... Construction work is brightest phase of current market

STRUCTURAL steel specifications continue to be the bright spot at PITTSBURGH. Carnegie-Illinois Steel Corp. has been awarded 6800 tons of material, including tunnel liners, structural shapes, etc., for contract 318, Delaware Aqueduct. Another section of this project is expected to be let soon. Outstanding inquiries include 15,000 tons for the Susquehanna River bridge superstructure at Havre de Grace, Md., and 13,000 tons for the superstructure of the Potomac River bridge. A Wilmot Street bridge at Pittsburgh will take about 1000 tons of fabricated steel.

Work under way in the CHICAGO district is considerable, but no outstanding tonnages have been awarded

this week. A number of jobs are about to close and should be reported within the next few weeks.

A sizable amount of tonnage is active in the PHILADELPHIA area, but the past week has been dull as regards awards. No award has been made for the 2300 tons of steel required for a Philadelphia apartment building planned by J. A. Greenberg, although when financing is completed the Turner Construction Co. will put up the building and Fort Pitt will fabricate the steel.

Outstanding new projects in the East are two bridges, one over the Potomac River to take 13,000 tons of steel, and the other over the Susquehanna River, calling for 15,000 tons.

General Mills, Inc., this week announced that it will build a \$2,000,000 plant in Buffalo.

At KANSAS CITY, Mo., the general contract for the 15th Street viaduct, requiring 3800 tons of structural shapes, was awarded to Spencer & Ross, Detroit.

Bids were opened by the Bureau of Reclamation for two bridges at Pollock Cal., requiring about 2500 tons of shapes. Power for Shasta Dam to be purchased by the contractor will require approximately 3000 tons, but date of award is indefinite.

MERCHANT BARS

... Orders decline moderately . . . Tractor plants busy

ALTHOUGH an analysis of hot rolled bar sales at PITTSBURGH still discloses fair diversification in incoming business, the trend of aggregate sales is pointed downward. Part of this adverse picture is attributed to a smaller volume of automotive buying but the major portion is undoubtedly due to exceptionally beclouded business conditions in general.

Merchant bar orders at CLEVELAND and YOUNGSTOWN continue to show less of a decline than related products. Demand is diversified but individual orders are small. Little change is expected for the immediate future except possibly for seasonal gains due to the advent of warmer weather.

Tractor plants in the CHICAGO area are operating at near-capacity, and are major factors in existing bar demand. Forgers and cold drawers, only moderately active now, should be increasingly busy as preparation for 1940 automobiles gets under way.

TUBULAR GOODS

... Sales show mixed trend in oil country goods

TOTAL tubular sales at PITTSBURGH are running about 10 per cent behind a month ago, due mainly to a further easing in the volume of oil country goods specifications. Merchant pipe sales are about on a par with a month ago and there has been little or no change in the movement of miscellaneous line pipe.

CLEVELAND and YOUNGSTOWN producers report livelier demand for oil country casing, which may enable April business to exceed that of March by a small margin, excluding the heavy line pipe orders booked this month. The jobber movement of consigned carloads has been more brisk also. Resale prices are erratic.

RAILROAD BUYING

... Great Northern orders 1000 cars . . . Also to buy rails

THE Great Northern has ordered 1000 wood-sheathed box cars of 50-ton capacity, this being the outstanding equipment order of the week. The entire lot went to the Pullman-Standard Car Mfg. Co. (Michigan City, Ind., plant) which will start to make deliveries within 60 days. Steel and cast iron wheels required will total about 10,000 tons. The Pullman Co. has ordered two sleeping cars from Pullman-Standard for use with the City of Denver trains of the Union Pacific—Chicago & North Western.

Other equipment business is pending. The Denver & Rio Grande Western is expected to place orders this week or next for 400 standard box cars, 100 automobile box cars, 50 65-ft. gondola cars and 100 underframes. Total steel involved is about 7000 tons. The Maine Central, which recently placed 300 box cars with the Major Car Corp., is still in the market for 300 open-top cars. The Central of Brazil is inquiring for 25 locomotives in addition to the 1000 cars reported last week. The Wabash has been authorized by the Federal Court at St. Louis to purchase 35 caboose cars.

As the result of an order issued by the Illinois Commerce Commission, the Chicago Rapid Transit Co., which operates the elevated lines, will find it necessary to make large expen-

ditures for cars and other equipment. All wood or part wood coaches must be replaced with steel coaches, a complete signal safety system must be installed and the elevated structures must be rehabilitated. About 1000 steel cars to cost \$25,000,000, signal equipment to cost \$4,000,000 and an expenditure of \$2,700,000 for repairs to elevated structures will be required.

The Great Northern is inquiring for an unstated tonnage of rails. It is understood that the purchase will amount to about 10,000 tons. The Grand Trunk Western has ordered 1533 tons of rails from Carnegie-Illinois Steel Corp. in addition to 530 tons ordered from Inland Steel Co., as reported last week. The Erie has allocated tie plates and spikes to accompany its recent order for 15,167 tons of rails. Rail buying for the year is believed to have been virtually completed.

The 15,000 tons of steel required by the Mount Vernon Car Mfg. Co. to build 1150 cars for the Missouri Pacific Railroad will not be placed for another 30 days, as the railroad will not expect delivery until some time this fall, it is understood. It is believed that 9000 tons for the sides of the cars will be placed in the Chicago district, and that the remaining 6000 tons will be placed with producers in the St. Louis district.

WIRE PRODUCTS

... Better weather may improve sales of merchant items

WIRE sales so far this month at PITTSBURGH are not up to the level of a month ago. Demand for both manufacturers' wire and merchant products continues spotty. Producers look for open weather to result in a much better movement of merchant items.

At CLEVELAND orders for merchant products are reported about even with last month. Owing to seasonal influences, the merchant field is more active than other wire divisions and helping sustain production at levels not sharply reduced from March. Large jobbers are ordering more freely. While a few weak spots have appeared here and there on prices, nothing general has developed.

CHICAGO and the surrounding area just now is beginning to receive some real spring weather, and, if it continues for two or three weeks with-

out serious interruption, the sale of merchant wire products in the rural districts is expected to show considerable improvement. In the industrial lines, uncertainty is holding back much buying, and the day-to-day policy of purchasing is being followed.

REINFORCING BARS

. . . Awards decline by half; fair weather improves outlook

CONCRETE bar specifications at PITTSBURGH are equal to the volume of a month ago but awards and new projects have declined recently in total tonnages. For the country as a whole awards during the past week were little more than half those of the preceding week. New business tapered to 15,289 tons last week from 20,400 tons the week before.

Bethlehem Steel Co. will provide 2217 tons for the Grand Coulee Dam-Columbia basin project, while Carnegie-Illinois Steel Corp. will supply 900 tons of bars for a section of the Delaware Aqueduct covered in contract 318.

Pending business includes 1735 tons for a circumferential highway in Queens, N. Y., while the Kittatinny-Blue Mountain tunnel in Franklin County, Pennsylvania, will require 1400 tons. The United States Engineer at LOS ANGELES, who recently opened bids on 2000 tons, is expected to call for bids about June 1 on Los Angeles River improvement work requiring 2750 tons. Favorable weather may bring out awards in the CHICAGO area where many projects are underway or contemplated. Bethlehem is low bidder on 2500 tons for the Yakima project at Buena, Wash.

TIN PLATE

. . . Production reaches 65% as orders gain moderately

TOTAL tin plate releases in the past week increased slightly from the previous week, with the result that operations are up two points to 65 per cent. Although tin plate demand has increased substantially in the past several weeks, a note of caution persists among large buyers. This condition exists despite the fact that tin plate consumption normally reaches a peak between April and July.

An increase in orders for tin plate has been reported in CHICAGO, but

the large stock of canned goods on hand is holding down the size of these purchases.

IRON ORE

. . . Ford Motor Co. issues season's first inquiry

FIRST inquiry of the season came recently from the Ford Motor Co. for 24,000 tons of high manganese ore, a comparatively small amount. In some quarters the opinion is expressed that this inquiry, because of its nature, may develop into more of a trade rather than an outright sale. Other consumers exhibit no haste in coming into the market.

Iron, Steel Exports Up 20.3% in March Scrap at Highest Point of Year

WASHINGTON—Making a gain of 20.3 per cent in quantity and 28.6 per cent in value, exports of iron and steel, exclusive of scrap, aggregated 162,098 gross tons, valued at \$12,569,693 in March, compared with 134,321 tons, valued at \$9,772,707 in February, according to preliminary figures of the Metals and Minerals Division, Bureau of Foreign and Domestic Commerce.

For the first quarter of the current year, exports totaled 431,663 tons, valued at \$32,556,947, a drop of 30.6 per cent in quantity and 21.7 per cent in value under the corresponding quarter of 1938, with exports of 621,792 tons, valued at \$41,585,202.

Non-alloy "other" plates by a narrow margin continued to be the prin-

cipal product exported in March, the total being 27,942 tons. They were closely followed by non-alloy black steel sheets, outgoing shipments of which were 27,805 tons. Canada was the chief purchasing country.

Exports of scrap in March were 310,223 tons, valued at \$4,640,598, the highest point for the current year. They compare with February exports of 222,704 tons, valued at \$3,345,344.

Scrap exports during the first quarter of 1939 were 758,361 tons, valued at \$11,337,293, compared with 946,150 tons, valued at \$16,017,972 during the corresponding quarter of 1938. Of the March exports of scrap, 200,470 tons went to Japan and 69,540 tons to Italy.

Weekly Bookings of Construction Steel

	Week Ended				Year to Date	
	Apr. 25, 1939	Apr. 18, 1939	Mar. 28, 1938	Apr. 26, 1938	1939	1938
Fabricated structural steel awards . . .	19,200	*29,100	11,900	16,320	338,660	219,295
Fabricated plate awards . . .	505	0	1,150	1,500	49,715	46,890
Steel sheet piling awards . . .	0	0	3,540	0	18,565	8,750
Reinforcing bar awards . . .	4,900	8,675	10,900	10,630	150,995	74,285
Total Letting of Construction Steel . . .	24,605	*37,775	27,490	28,450	557,935	349,220

* Revised.

FABRICATED STEEL

... Lettings decline to 19,200 tons from 29,100 tons last week . . . New projects jump to 43,220 tons from 14,900 tons a week ago . . . Plate awards only 505 tons

NORTH ATLANTIC STATES AWARDS

6800 Tons, New York, includes tunnel liners, piling section, small amount of fabricated material, for contract 318, Delaware Aqueduct, to Carnegie-Illinois Steel Corp., Pittsburgh, through Pleasantville Contracting Co., Pleasantville, N. Y.
1500 Tons, Washington, Procurement Division, Treasury Department, navy cranes, to Harnischfeger Corp., Milwaukee.
1150 Tons, Queens, N. Y., contract SC-39-5, grade eliminations, to Bethlehem Steel Co., Bethlehem, Pa.
500 Tons, Pittsburgh, factory building for Allis-Chalmers Mfg. Co., to Bethlehem Steel Co.
475 Tons, Brooklyn, curbing, to Phoenix Bridge Co., Phoenixville, Pa.
400 Tons, Brooklyn, ramp connection, routes 109 and 49, to Fort Pitt Bridge Works Co., Pittsburgh.
370 Tons, Washington, laboratory, Bureau of Standards, to Fort Pitt Bridge Works Co., Pittsburgh.
300 Tons, Chelsea, Mass., section of metropolitan sewer, to Commercial Shearing & Stamping Co., Youngstown.
235 Tons, Norwich, Conn., Shetucket River State bridge, to Bethlehem Steel Co.
210 Tons, Queens, N. Y., contract SC-39-6, 115th Avenue, to American Bridge Co., Pittsburgh.
150 Tons, Baltimore, shop building for Charles T. Brandt, Inc., to Maryland Steel Products Co., Baltimore.
135 Tons, Bayonne, N. J., boiler house extension for Tide Water Associated Oil Co., to Savary & Glaeser Co., Dunellen, N. J.
110 Tons, Somerset County, Pa., Pennsylvania Turnpike Commission, girder span, to Fort Pitt Bridge Works Co., Pittsburgh.
105 Tons, Springfield, Vt., Jones & Lamson Machine Co. plant, to New England Structural Co., Everett, Mass.

CENTRAL STATES

3900 Tons, Kansas City, Mo., 15th Street viaduct, to American Bridge Co., Pittsburgh.
1075 Tons, Bloomington, Ind., auditorium, to R. C. Mahon Co., Detroit.
305 Tons, Niagara, Wis., boiler house for Kimberley-Clark Corp., to Lakeside Bridge & Steel Co., Milwaukee.
210 Tons, Chagrin Falls, Ohio, school, to Ingalls Iron Works Co., Verona, Pa., through Gillmore, Carmichael & Olson Co., Cleveland (also 50 tons reinforcing steel to Patterson-Leich Co., Cleveland).
155 Tons, St. Louis, bridge, to Missouri Valley Structural Steel Co., St. Louis.
135 Tons, Murray, Neb., viaduct over Missouri-Pacific Railroad, to Illinois Steel Bridge Co., Jacksonville, Ill.
130 Tons, Milwaukee, F. W. Woolworth Co. store, to American Bridge Co., Pittsburgh.
105 Tons, Aurora, Ill., factory building, to Hansell-Eelock Co., Chicago.
105 Tons, St. Joseph, Mich., factory building, to Joseph T. Ryerson & Son, Inc., Chicago.

WESTERN STATES

300 Tons, Kremmling, Colo., Colorado River State bridge, to American Bridge Co.
200 Tons, San Francisco, St. Mary's Hospital, to Judson-Pacific Co., San Francisco.
115 Tons, State of Washington, erection trusses, Specification 832, to Missouri Valley Structural Steel Co., St. Louis.

PENDING STRUCTURAL PROJECTS

NORTH ATLANTIC STATES

15,000 Tons, Havre de Grace, Md., superstructure, Susquehanna River Bridge.
13,000 Tons, Ludlow Ferry, Md.-Dahlgren, Va., Potomac River Bridge superstructure.
2000 Tons, Pittsburgh, Wilmot Street bridge.
1600 Tons, State of Pennsylvania, two highway tunnels, one through Allegheny Mountain other through Kittatinny Mountain; bids postponed to May 4 and 5.

900 Tons, Atlantic City, N. J., apartment building for Chelsea Housing Corp.
800 Tons, Bedford County, Pa., Juniata River bridge for Pennsylvania Turnpike Commission.
300 Tons, New York, freight house addition for New York Central Railroad Co.; bids due May 2.
300 Tons, Long Island City, N. Y., contract No. 19, buildings for New York City Tunnel Authority.
300 Tons, Boston, Albany Street bridge repairs.
275 Tons, Lawrence, Mass., bridges.
250 Tons, Nitro, W. Va., addition for American Viscose Co.; bids April 27.
215 Tons, Rensselaer, N. Y., school building.
215 Tons, Beltsville, Md., heating plant for Department of Agriculture.
200 Tons, New York, building for Beatrice B. Berle.
200 Tons, Groton, N. Y., shop and storage building for Electric Boat Co.
175 Tons, South Jamaica, N. Y., bus terminal for Green Bus Lines, Inc.
125 Tons, Storrs, Conn., central heating plant for State.
125 Tons, Williamantic, Conn., F. W. Woolworth Co. building.
115 Tons, Brooklyn, alterations to buildings for Remsenburg Realty Corp.
100 Tons, Berks County, Pa., highway bridge; bids May 5.

THE SOUTH

330 Tons, Nitro, W. Va., buildings for American Viscose Corp.
227 Tons, Marlin, Tex., underpass.

CENTRAL STATES

3000 Tons, Lorain, Ohio, bascule bridge; bids soon.

WESTERN STATES

1508 Tons, Seattle, Wash., Ballard bridge approaches, revised, also 750 tons of bars, 113 tons of piling; bids May 4. See reinforcing projects pending for alternate proposal.
900 Tons, San Francisco, buildings for American Smelting & Refining Co.
120 Tons, Mare Island, Cal., radio towers.

FABRICATED PLATES AWARDS

400 Tons, Grand Fork, N. D., water tank, to Pittsburgh-Des Moines Steel Co., Des Moines. Includes shapes.
105 Tons, Grand Coulee Dam, Wash., 36-in. pipe, to Associated Pipe & Supply Co.

PENDING PROJECTS

4700 Tons, Chicago, fifth section subway; new bids asked. John Griffiths & Son Co., low bidder previously.
400 Tons, Bethlehem, Pa., municipal water supply, 38-in. pipe, to be used in connection with new dam; bids soon.
120 Tons, Pollock, Cal., tunnel supports (Specification S39); bids May 2.

SHEET PILING

PENDING PROJECTS

1250 Tons, Cleveland, bulkhead cut No. 6, contract No. 7; bids April 27.
400 Tons, Clarksville, Mo., upper guard wall for lock and dam No. 24, Mississippi River; bids May 9.

Educational Orders Awarded by U. S.

WASHINGTON—The War Department late last week announced award of the first so-called educational orders to be made under the \$10,000,000 program authorized by Congress last June. Enacted to familiarize industry with the Government's war-time requirements, the law authorized the orders to be placed at the rate of \$2,000,000 a year.

The first awards, requiring a total expenditure of the full \$2,000,000 for the current fiscal year, went to the following companies:

Goodyear Tire & Rubber Co., Akron, Ohio, gas masks; Winchester Repeating Arms Co., New Haven, Conn., new semi-automatic rifles; General Electric Co., Schenectady, N. Y., searchlights; R. Hoe & Co., New York, recoil mechanisms for anti-aircraft guns; S. A. Woods Machine Co., Boston, machining of 75-millimeter shells; American Forge Co., Chicago, forgings for 75-millimeter shells.

Additional trial orders, to be placed under the broadened educational orders program just passed by Congress and calling for expenditures of \$34,500,000 during the next three years, will be made shortly for guns, planes, shells and tanks. Assistant Secretary of War Johnson estimated that these orders will be placed with approximately 270 plants.

Sheet & Tube Quarterly Profit Is \$217,106

YOUNGSTOWN SHEET & TUBE CO and subsidiaries report for the first quarter net profit of \$217,106 after depreciation, interest, taxes and depletion compared with net loss of \$139,529 for first quarter of 1938.

Leonard J. Kaufman, president, L. J. Kaufman Mfg. Co., Manitowoc, Wis., announces purchase of the Gaterman line of tapping machines from the W. Gaterman Mfg. Co., also of Manitowoc. In the future these tapping machines will be manufactured in the Kaufman Mfg. Co. plant. Several new features have been incorporated in the new "Hi-duty" tapper.

NON-FERROUS

... Smelters offer copper at 10c., Valley ... Active call for tin and lead develops ... March brass and bronze shipments at 17-month peak ... Spelter demand light.

NEW YORK, April 25—Domestic consumers were a little more optimistic last week over the foreign situation and lead and tin buyers responded to the improved outlook with fairly heavy purchases. The copper and zinc markets, however, were very quiet, with further adjustments in domestic copper prices probably the chief cause of the continued hesitancy of buyers of these metals to replenish their badly depleted reserves.

Last Wednesday both producers and custom smelters reduced prices to 10.25c. per lb., Connecticut Valley. Then on Friday a leading smelter announced a further reduction to 10c., which at the time of going to press, had not been followed by the producers. Most consumers feel that eventually the producers will acknowledge the 10c. level for at that point the producers' market is in alignment with the present open market price

NON-FERROUS PRICES

Cents per lb. for early delivery

	Apr. 19	Apr. 20	Apr. 21	Apr. 22	Apr. 24	Apr. 25
Copper, Electrolytic ¹	10.50	10.25	10.00	10.00	10.00	10.00
Copper, Lake	10.50	10.25	10.25	10.25	10.25	10.25
Tin, Straits, New York	47.50	47.50	47.875	....	48.125	48.25
Zinc, East St. Louis ²	4.50	4.50	4.50	4.50	4.50	4.50
Lead, St. Louis ³	4.60	4.60	4.60	4.60	4.60	4.60

¹ Delivered Conn. Valley, deduct 1/4c. for New York delivery. ² Add 0.39c. for New York delivery. ³ Add 0.15c. for New York delivery.

Warehouse Prices

Cents per lb., Delivered

New York Cleveland	
Tin, Straits pig	49.25c. 51.25c.
Copper, Lake	11.50c. 11.375c.
Copper, electro	11.375c. 11.375c.
Copper, Castings	11.00c. 11.00c.
*Copper sheets, hot-rolled	18.37c. 18.37c.
*High brass sheets	16.65c. 16.65c.
*Seamless brass tubes..	19.40c. 19.40c.
*Seamless copper tubes.	18.87c. 18.87c.
*Brass rods	12.00c. 12.00c.
Zinc slabs	6.15c. 6.90c.
Zinc sheets, No. 9 casks	10.50c. 12.10c.
Lead, American pig ...	5.75c. 5.60c.
Lead, bar	6.35c. 8.25c.
Lead, sheets, cut	8.00c. 8.00c.
Antimony, Asiatic	15.00c. 17.00c.
Alum., virgin, 99 per cent plus	22.50c. 22.50c.
Alum., No. 1 remelt, 98 to 99 per cent	19.50c. 19.50c.
Solder, 1/2 and 1/2	29.10c. 29.25c.
Babbitt metal, commercial grade	21.25c. 21.50c.

* These prices, which are also for delivery from Chicago warehouses, are quoted with the following percentages allowed off for extras: on copper sheets, 33 1/3; on brass sheets and rods, 40, and on brass and copper tubes, 25.

Old Metals

Cents per lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators. Selling prices are those charged to consumers after the metal has been prepared for their uses.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible..	8.00c.	9.75c.
Copper, hvy. and wire..	7.00c.	7.50c.
Copper, light and bottoms	6.25c.	6.50c.
Brass, heavy	4.125c.	4.625c.
Brass, light	3.25c.	4.00c.
Hvy. machine composition	6.25c.	7.75c.
No. 1 yel. brass turnings	4.00c.	4.50c.
No. 1 red brass or compositions, turnings	6.00c.	6.625c.
Lead, heavy	3.625c.	4.50c.
Cast aluminum	6.50c.	7.75c.
Sheet aluminum	12.25c.	13.75c.
Zinc	2.125c.	3.375c.

Miscellaneous Non-Ferrous Prices

ALUMINUM, delivered; virgin, 99 per cent plus, 20c.-21c. a lb.; No. 12 remelt No. 2 standard, 19c.-19.50c. a lb. NICKEL, electrolytic, 35c.-36c. a lb. base refinery, lots of 2 tons or more. ANTIMONY, prompt, New York; Asiatic, 14c. a lb., f.o.b.; American, 11.50c. a lb. QUICKSILVER, \$94 per flask of 76 lb. BRASS INGOTS, commercial 85-5-5-5, 10.25c. a lb.

and the foreign price. Trading in the open market in the past week was very slow. On Monday sellers were asking 9.95c. per lb., Valley delivery, with buyers indicating that their interest was around 9.875c.

Lead

Indications that consumers were finally becoming concerned over their May needs, after ignoring that month for some time, were in evidence last week when the call for lead shifted from April to May. The week's business was well diversified and the volume was the best since the first week of March. The buying brought April coverage up to about 95 per cent and May to 45 per cent. Prices are unaltered at 4.75c. per lb., New York. Domestic lead production in March was 40,799 tons against 39,336 tons in February, while shipments were 40,871 against 34,421.

Zinc

The demand for spelter continues very light, the past week's prime Western sales amounting to only 1199 tons. Shipments continue to be greatly in excess of buying and sellers' backlog are growing smaller each week. The past week's deliveries of 4150 tons reduced undelivered contracts to 26,312 tons.

Brass and Bronze Ingots

Deliveries of brass and bronze ingots in March by members of the Non-Ferrous Ingot Metal Institute totaled 5818 tons, the highest monthly total since September, 1937. In February shipments were 4662 tons and in March, 1938, were 3305 tons. Average price per lb. received by the institute's membership during the 28-day period ended April 14, on commercial 85-5-5-5 and 80-10-10 mixtures were 10.518c. and 12.551c. respectively. In the preceding period the averages were 10.308c. and 12.157c.

Tin

Consumers, particularly tin plate makers, bought heavily last week in nearby positions as prices advanced to the highest level in 19 months. On Friday the turnover is estimated to have been all of 1000 tons. Spot metal continues to sell at a premium of about 30 points over futures. The London market was also active in the past and prices advanced to £222 15s. on spot this morning as compared with £218 5s. a week ago. Prompt Straits tin in New York today was selling at 48.25c. per lb. against 47.50c. on Tuesday a week ago.

IRON AND STEEL SCRAP

... Composite declines 9c. to \$14.33 as a result of further weakness at Pittsburgh . . . Most markets are quiet.

APRIL 25—Scrap prices continue to decline, but the pace has slowed down to a crawling movement in place of the precipitous decline that took place the week before. Based on broker offers and small tonnage sales into consumption at \$15 at Pittsburgh, the average price of No. 1 heavy melting steel is down 25c. there. Quietness reigns in the Chicago market, with the price of No. 1 remaining the same as last week and other prices subject to modifications in line with the drastic drop in the prime grade a week ago. No. 1 at Philadelphia is also unchanged in price, so that the net change in the composite price for No. 1 steel is 9c. downward, bringing the current figure to \$14.33, new low for the year.

Few changes in price have taken place elsewhere. Principal grades in the Cleveland market are down 50c. on the basis of dealer transactions, and dealers at Cincinnati are offering 25c. less all along the line. Machine shop turnings and other blast furnace grades are generally weak throughout the country, probably reflecting the curtailment of furnace operations in the face of the continued deadlock in the soft coal labor dispute.

Export prices at Port Richmond have eased off 25c., following weakness in the domestic market, but resumption of buying at Boston has boosted the price of No. 1 there a like amount. New York buying prices are unchanged.

Pittsburgh

This market continues to show signs of further weakness, with practically all consumers in this district out of the market. Several brokers have offered No. 1 steel for sale into consumption at \$15 a ton and although the majority of mills were indifferent, some small tonnages have been sold into consumption during the past week at that price. One large consumer has cancelled overdue balances on scrap purchases made several weeks ago. With brokers having offered moderate sized tonnages of No. 1 heavy melting at \$15 and with small sales having actually been made, this grade is quotable at \$14.50 to \$15 a ton, down 25c. a ton from last week's level. Other grades of scrap have also been marked down on an average of 50c. a ton. There are little or no shortages in the district.

Last week's Pittsburgh scrap market, issue April 20, incorrectly quoted compressed sheets and hand bundled sheets. Compressed sheets should have been quoted at \$14.75 to \$15.25 instead of \$15.50 to \$16, while hand bundled sheets should

have been quoted at \$13.75 to \$14.25 instead of \$14.50 to \$15.

Chicago

After the sale two weeks ago at \$13, the Chicago market has again become quiet. It is believed by some that the sale was a bit too large, in view of the difficulties apparent in covering. It is necessary to pay \$12.75 in most cases. Though operations are slipping, and there is reason to believe further reductions in the district rate are not far off, the scrap market is firm at its present levels.

Philadelphia

With steel making operations dropping off slowly, the undertone of the market is naturally none too steady. However, the absence of distress material and the regular demand for export material at Port Richmond serve to maintain a fairly steady position pricewise. Mills are doing little buying of No. 1 steel, but lots that are being placed are bringing about \$15.50, delivered. Activity in machine shop turnings continues, and moderate lots were turned over during the week at levels in the neighborhood of \$8.50 to \$9 a ton, delivered. Offering prices for both No. 1 and No. 2 steel at Port Richmond have dropped off 25c. a ton, but the insistent demand for supplies is preventing declines similar to those taking place in the domestic market. Tonnage clearing this port remains quite high, being in the neighborhood of 15,000 tons monthly.

Cleveland

Principal quotations on the list are down 50c. this week, based upon dealer transactions. Very little scrap is moving here except to one mill against old commitments. In some quarters it is believed the decline has now hit bottom for the time being.

Youngstown

Scrap continues to move here into mill consumption, this district being a little more active from the standpoint of deliveries than other nearby centers. Principal quotations are unchanged this week, No. 1 heavy melting steel being quoted at \$14.50 to \$15. Small dealers are not being stamped by recent events. Some look for restoration of recent value later this year.

Buffalo

The first lake shipment of the season was completed this week when the steamer Chelen arrived at Buffalo docks from Detroit carrying 2675 tons of borings and turnings. Restrictions have been raised at one of the mills in the district and old orders are flowing more freely. As yet the market has shown no stronger tendencies.

St. Louis

An East side mill bought 7000 tons of No. 1 and 2 heavy melting steel at \$12.50 and \$11.50 a ton, respectively, in line with previously quoted prices, and the sale has

steadied the scrap iron market in the St. Louis district. No. 1 locomotive tires are off 75c. a ton, and No. 2 wrought, cast iron earwheels are 50c. lower and No. 1 machinery cast \$1.50 less. Railroad lists: Pennsylvania, 13,000 tons; Chicago, Burlington & Quincy, 4900 tons, and Chicago, Rock Island & Pacific, 2400 tons.

Cincinnati

Uncertainty tends to weaken the scrap market with dealers' bids down about 25c. Trading is desultory with dealers closing only for needed material or that from the usual sources. Sheet clippings and No. 1 steel is moving on orders but the foundry grades are without encouraging activity. Mills show no interest on new contracts unless prices are attractive.

Detroit

In the absence of activity in the Detroit market area, scrap price quotations are unchanged this week although sentiment generally is weaker. Automotive lists which will close at the end of the month indicate somewhat smaller output of scrap again in May, the decrease being about the same as that recorded for April. It is the general belief that scrap output will taper sharply to a virtual zero late in June when new model changeovers are made. The operating rate for open hearths in this area seems to have been stabilized, with indications that the low point has been reached.

Toronto

Interest in iron and steel scrap continues to mount and local dealers state that sales have shown improvement during the past week or 10 days. New offerings of scrap are also on the upgrade and yards are more heavily stocked than for several months past. Supplies are coming in from all sections of the province through small collectors, chiefly sheet steel and automobile scrap. Demand in turn is picking up and sales of heavy melting steel is fairly active while cast scrap demand still is ahead of available supplies. There is little current call for borings and turnings. Most of the big local consumers of scrap are still carrying big stock piles and are not pushing for deliveries. Prices are holding firm at recently revised levels.

New York

The local market is without feature and both export buying prices and prices for material on cars for domestic consumption are unchanged. Brokers are inclined to take their cue from the headlines and are watching developments abroad and their unpredictable effects upon the present export market.

Boston

Resumption of export buying of No. 1 steel has brought the top price back to \$14 a ton delivered dock, contrasted with \$13.75 a week ago. The fact that no surplus of this material exists is a strengthening factor. On the other hand, the market for No. 2 steel is no better, the top being \$12.75 a ton delivered dock, as quoted last week. Shortly a boat will arrive here and another at Portland, Me., to load scrap for England. The domestic scrap market has but one bright spot, the resumption of buying of No. 1 steel by the American Steel & Wire Co., Worcester, at \$13.25 a ton delivered.

Iron and Steel Scrap Prices

PITTSBURGH

Per gross ton delivered to consumer:	
No. 1 hvy. mltng. steel.	\$14.50 to \$15.00
Railroad hvy. mltng...	15.50 to 16.00
No. 2 hvy. mltng. steel.	13.50 to 14.00
Scrap rails	16.00 to 16.50
Rails 3 ft. and under..	18.00 to 18.50
Comp. sheet steel ...	14.50 to 15.00
Hand bundled sheets ..	13.50 to 14.00
Hvy. steel axle turn..	13.00 to 13.50
Machine shop turn....	9.00 to 9.50
Short shov. turn....	10.00 to 10.50
Mixed bor. & turn....	8.50 to 9.00
Cast iron borings	8.50 to 9.00
'cast iron carwheels...	15.00 to 15.50
Hvy. breakable cast...	12.00 to 12.50
No. 1 cupola cast....	15.00 to 15.50
RR. knuckles & cplrs.	17.00 to 17.50
Rail coil & leaf springs	17.50 to 18.00
Rolled steel wheels...	17.50 to 18.00
Low phos. billet crops.	18.50 to 19.00
Low phos. punchings..	17.00 to 17.50
Low phos. plate	16.00 to 17.00

CLEVELAND

Per gross ton delivered to consumer:	
No. 1 hvy. mltng. steel.	\$13.50 to \$14.00
No. 2 hvy. mltng. steel.	12.50 to 13.00
Comp. sheet steel ...	13.00 to 13.50
Light bund. stampings	10.00 to 10.50
Drop forge flashings..	11.50 to 12.00
Machine shop turn....	7.00 to 7.50
Short shov. turn....	8.00 to 8.50
No. 1 busheling	13.00 to 13.50
Steel axle turnings....	11.00 to 11.50
Low phos. billet and	
bloom crops	17.50 to 18.00
Cast iron borings	8.00 to 8.50
Mixed bor. & turn....	8.00 to 8.50
No. 2 busheling	8.00 to 8.50
No. 1 cupola cast	15.00 to 15.50
Railroad grate bars ..	9.00 to 9.50
Stove plate	9.50 to 10.00
Rails under 3 ft.	17.25 to 17.75
Rails for rolling	17.50 to 18.00
Railroad malleable ...	15.00 to 15.50
Cast iron carwheels ..	14.00 to 14.50

PHILADELPHIA

Per gross ton delivered to consumer:	
No. 1 hvy. mltng. steel.	\$15.50
No. 2 hvy. mltng. steel.	13.50
Hydraulic bund., new	\$14.50 to 15.00
Hydraulic bund., old..	11.00 to 11.50
Steel rails for rolling..	17.00 to 17.50
Cast iron carwheels ..	16.00 to 16.50
Hvy. breakable cast...	15.00 to 15.50
No. 1 cast	16.50 to 17.00
Stove plate (steel wks.)	13.00 to 13.50
Railroad malleable ...	15.50 to 16.00
Machine shop turn....	8.50 to 9.00
No. 1 blast furnace....	6.50 to 7.00
Cast borings	6.50 to 7.00
Heavy axle turnings..	10.00 to 10.50
No. 1 low phos. hvy...	17.50 to 18.00
Couplers & knuckles..	17.50 to 18.00
Rolled steel wheels...	17.50 to 18.00
Steel axles	20.00 to 20.50
Shafting	20.50 to 21.00
Spec. iron & steel pipe	12.00 to 12.50
No. 1 forge fire....	12.00 to 12.50
Cast borings (chem.)..	9.50 to 10.00

CHICAGO

Delivered to Chicago district consumers:	
Per Gross Ton	
Hvy. mltng. steel	\$12.50 to \$13.00
Auto. hvy. mltng. steel	
alloy free	11.25 to 11.75
No. 2 auto steel	10.50 to 11.00
Shoveling steel	12.50 to 13.00
Factory bundles	11.75 to 12.25
Dealers' bundles	10.75 to 11.25
Drop forge flashings...	9.25 to 9.75
No. 1 busheling	11.25 to 11.75
No. 2 busheling, old...	5.25 to 5.75
Rolled carwheels	14.50 to 15.00
Railroad tires, cut ..	14.50 to 15.00
Railroad leaf springs..	14.50 to 15.00
Steel coup. & knuckles..	14.50 to 15.00
Axle turnings	11.50 to 12.00
Coil springs	16.00 to 16.50
Axle turn. (elec.)....	13.00 to 13.50
Low phos. punchings..	15.50 to 16.00
Low phos. plates 12 in.	
and under	15.00 to 15.50
Cast iron borings	5.50 to 6.00
Short shov. turn....	6.00 to 6.50
Machine shop turn....	6.00 to 6.50
Rerolling rails	16.50 to 17.00
Steel rails under 3 ft.	15.50 to 16.00
Steel rails under 2 ft.	16.00 to 16.50
Angle bars, steel	15.00 to 15.50
Cast iron carwheels ..	12.25 to 12.75
Railroad malleable ...	14.50 to 15.00
Agric. malleable	10.75 to 11.25

Per Net Ton	
Iron car axles	\$18.00 to \$18.50
Steel car axles	17.50 to 18.00
Locomotive tires	13.00 to 13.50
Pipes and flues	8.50 to 9.00
No. 1 machinery cast..	11.50 to 12.00
Clean auto. cast	12.50 to 13.00
No. 1 railroad cast....	10.50 to 11.00
No. 1 agric. cast	10.00 to 10.50
Stove plate	7.25 to 7.75
Grate bars	7.75 to 8.25
Brake shoes	9.00 to 9.50

YOUNGSTOWN

Per gross ton delivered to consumer:	
No. 1 hvy. mltng. steel.	\$14.50 to \$15.00
No. 2 hvy. mltng. steel.	13.50 to 14.00
Low phos. plate	15.50 to 16.00
No. 1 busheling	13.75 to 14.25
Hydraulic bundles	14.00 to 14.50
Machine shop turn....	9.00 to 9.50

CLEVELAND

Per gross ton delivered to consumer:	
No. 1 hvy. mltng. steel.	\$13.50 to \$14.00
No. 2 hvy. mltng. steel.	12.50 to 13.00
Comp. sheet steel ...	13.00 to 13.50
Light bund. stampings	10.00 to 10.50
Drop forge flashings..	11.50 to 12.00
Machine shop turn....	7.00 to 7.50
Short shov. turn....	8.00 to 8.50
No. 1 busheling	13.00 to 13.50
Steel axle turnings....	11.00 to 11.50
Low phos. billet and	
bloom crops	17.50 to 18.00
Cast iron borings	8.00 to 8.50
Mixed bor. & turn....	8.00 to 8.50
No. 2 busheling	8.00 to 8.50
No. 1 cupola cast	15.00 to 15.50
Railroad grate bars ..	9.00 to 9.50
Stove plate	9.50 to 10.00
Rails under 3 ft.	17.25 to 17.75
Rails for rolling	17.50 to 18.00
Railroad malleable ...	15.00 to 15.50
Cast iron carwheels ..	14.00 to 14.50

BIRMINGHAM

Per gross ton delivered to consumer:	
Hvy. melting steel....	\$12.50 to \$14.00
Scrap steel rails	14.50 to 15.00
Short shov. turnings..	7.50 to 8.10
Stove plate	9.00 to 10.00
Steel axles	15.00 to 16.00
Iron axles	15.00 to 16.00
No. 1 RR, wrought	10.00
Rails for rolling	16.00 to 16.50
No. 1 cast	14.50
Tramcar wheels	14.00

DETROIT

Dealers' buying prices per gross ton:	
No. 1 hvy. mltng. Indus-	
trial steel	\$10.00 to \$10.50
No. 2 hvy. mltng. steel.	8.50 to 9.00
Borings and turnings..	6.75 to 6.25
Long turnings	5.00 to 5.50
Short shov. turnings..	6.00 to 6.50
No. 1 machinery cast..	12.50 to 13.00
Automotive cast	13.00 to 13.50
Hvy. breakable cast...	9.00 to 9.50
Stove plate	7.50 to 8.00
Hydraul. comp. sheets.	11.00 to 11.50
New factory bushel...	10.00 to 10.50
Sheet clippings	7.25 to 8.25
Flashings	9.00 to 9.50
Low phos. plate scrap.	11.00 to 11.50

NEW YORK

Dealers' buying prices per gross ton:	
on cars:	
No. 1 hvy. mltng. steel	\$11.00 to \$11.50
No. 2 hvy. mltng. steel.	9.00 to 9.50
Hvy. breakable cast...	10.50 to 11.00
No. 1 machinery cast.	11.50 to 12.00
No. 2 cast	9.50 to 10.00
Stove plate	9.50 to 10.00
Steel car axles	20.00 to 20.50
Shafting	15.50 to 16.00
No. 1 RR, wrought...	11.00 to 11.50
No. 1 wrought long...	9.50 to 10.00
Spec. iron & steel pipe	9.00 to 9.50
Rails for rolling	16.00 to 16.50
Clean steel turnings*	4.00 to 4.50
Cast borings*	3.50 to 4.00
No. 1 blast furnace...	3.50 to 4.00
Cast borings (chem.)	9.50 to 10.00
Unprepared yard scrap	6.00 to 6.50
Light iron	3.00 to 3.50

* \$1.50 less for truck loads.
† Northern N. J. prices are \$2 to \$2.50 higher

BOSTON

Dealers' buying prices per gross ton:	
Breakable cast	\$3.38 to \$4.11
Machine shop turn....	2.00 to 2.25
Mixed bor. & turn....	2.25
Bun. skeleton long...	7.90
Shafting	15.75
Cast bor. chemical...	4.50 to 5.00
Per gross ton delivered consumers' yards:	
Textile cast	\$12.50 to \$14.00
No. 1 machine cast....	12.50 to 14.00
Per gross ton delivered dealers' yards:	
No. 1 hvy. mltng. steel.	\$11.50 to \$11.75
No. 2 steel	10.00 to 10.25

PACIFIC COAST

Per gross ton delivered to consumer:	
No. 1 hvy. mltng. steel.	\$12.00 to \$13.00
No. 2 hvy. mltng. steel.	11.00 to 12.00

CANADA

Dealers' buying prices at their yards, per gross ton:	
Toronto Montreal	
No. 1 hvy. mltng. steel.	\$10.00
No. 2 hvy. mltng. steel.	8.50
Mixed dealers steel...	7.25
Drop forge flashings...	9.25
New loose clippings...	4.75
Busheling	4.50
Scrap pipe	5.75
Steel turnings	5.25
Cast borings	4.00
Machinery cast	15.25
Dealers cast	13.25
Stove plate	11.25

EXPORT

Dealers' buying prices per gross ton:	
New York, truck lots, delivered, barges	
No. 1 hvy. mltng. steel.	\$12.00 to \$12.50
No. 2 hvy. mltng. steel.	10.50 to 11.00
No. 2 cast	10.50 to 11.00
Stove plate	9.50 to 10.00

PRICES ON FINISHED AND SEMI-FINISHED IRON AND STEEL

Steel prices on these pages are base prices only and f.o.b. mill unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, cutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are affected by extras, deductions, and in most cases the amount of freight which must be absorbed in order to meet competition.

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (Rerolling only). Prices delivered Detroit are \$2 higher. F.o.b. Duluth, billets only, \$2 higher.

Per Gross Ton

Rerolling \$34.00
Forging quality 40.00

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

Per Gross Ton

Open hearth or bessemer \$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

Per Lb.

Grooved, universal and sheared 1.90c.

Wire Rods

(No. 5 to 9/32 in.)

Per Gross Ton

Pittsburgh, Chicago or Cleveland \$43.00
Worcester, Mass. 45.00
Birmingham 43.00
San Francisco 52.00
Rods over 9/32 in. or 47/64 in., inclusive, \$5 a ton over base.

SOFT STEEL BARS

Base per Lb.

Pittsburgh, Chicago, Gary, Cleveland, Buffalo and Birmingham 2.25c.
Detroit, delivered 2.35c.
Duluth, delivered 2.35c.
Philadelphia, delivered 2.57c.
New York 2.59c.
On cars dock Gulf ports 2.60c.
On cars dock Pacific ports 2.85c.

RAIL STEEL BARS

(For merchant trade)

Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham 2.10c.
On cars dock Tex. Gulf ports 2.45c.
On cars dock Pacific ports 2.70c.

BILLET STEEL REINFORCING BARS

(Straight lengths as quoted by distributors)

Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Cleveland, Youngstown or Sparrows Pt. 1.90c. to 2.05c.
Detroit, delivered 2.00c. to 2.15c.
On cars dock Tex. Gulf ports 2.25c. to 2.40c.
On cars dock Pacific ports 2.50c.

RAIL STEEL REINFORCING BARS

(Straight lengths as quoted by distributors)

Pittsburgh, Chicago, Gary, Buffalo, Cleveland, Youngstown or Birmingham 1.75c. to 1.90c.
Detroit, delivered 1.85c. to 2.00c.
On cars dock Tex. Gulf ports 2.10c. to 2.25c.
On cars dock Pacific ports 2.35c.
Prices on reinforcing bars have been subject to concessions of \$3 a ton or more from above quotations.

IRON BARS

Chicago and Terre Haute 2.15c.
Pittsburgh (refined) 3.60c.

COLD FINISHED BARS AND SHAFTING*

Base per Lb.

Pittsburgh, Buffalo, Cleveland, Chicago and Gary 2.70c.
Detroit 2.75c.

* In quantities of 10,000 to 19,000 lb.

PLATES

Base per Lb.

Pittsburgh, Chicago, Gary, Birmingham, Sparrows Point, Cleveland, Youngstown, Coatesville, Clayton, Del. 2.10c.
Philadelphia, del'd 2.15c.
New York, del'd 2.29c.
On cars dock Gulf ports 2.45c.
On cars dock Pacific ports 2.60c.
Wrought iron plates, P'tg 3.80c.

FLOOR PLATES

Pittsburgh or Chicago 3.35c.
New York, del'd 3.71c.
On cars dock Gulf ports 3.70c.
On cars dock Pacific ports 3.95c.

STRUCTURAL SHAPES

Base per Lb.

Pittsburgh, Chicago, Gary, Buffalo, Bethlehem or Birmingham 2.10c.
Philadelphia, del'd 2.215c.
New York, del'd 2.27c.
On cars dock Gulf ports 2.45c.
On cars dock Pacific ports 2.70c.

STEEL SHEET PILING

Base per Lb.

Pittsburgh, Chicago or Buffalo 2.40c.
On cars dock Gulf ports 2.85c.
On cars dock Pacific ports 2.90c.

RAILS AND TRACK SUPPLIES

F.o.b. Mill

Standard rails, heavier than 60 lb., per gross ton \$40.00
Angle bars, per 100 lb. 2.70

F.o.b. Basing Points

Light rails (from billets) per gross ton \$40.00
Light rails (from rail steel) per gross ton 39.00

Base per Lb.

Cut spikes 3.00c.
Screw spikes 4.55c.
Tie plates, steel 2.15c.
Tie plates, Pacific Coast ports. 2.25c.
Track bolts, to steam railroads 4.15c.
Track bolts to jobbers, all sizes (per 100 counts) 65.5

Basing points on light rails are Pittsburgh, Chicago and Birmingham; on spikes and tie plates, Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; on tie plates alone, Steelton, Pa., Buffalo; on spikes alone, Youngstown, Lebanon, Pa., Richmond, Va.

SHEETS

Hot Rolled

Base per Lb.

Pittsburgh, Gary, Birmingham, Buffalo, Sparrows Point, Cleveland, Youngstown, Middletown or Chicago 2.15c.
Detroit, delivered 2.25c.
Philadelphia, delivered 2.32c.
Granite City 2.25c.
On cars dock Pacific ports 2.65c.
Wrought iron, Pittsburgh 4.25c.

Cold Rolled*

Pittsburgh, Gary, Buffalo, Youngstown, Cleveland, Middletown or Chicago 3.20c.
Detroit, delivered 3.30c.
Granite City 3.30c.
Philadelphia, delivered 3.52c.
On cars dock Pacific ports 3.80c.

* Mill run sheets are 10c. per 100 lb. less than base; and primes only, 25c. above base.

Galvanized Sheets, 24 Gage

Pittsburgh, Chicago, Gary, Sparrows Point, Buffalo, Middletown, Youngstown or Birmingham 3.50c.
Philadelphia, del'd 3.67c.
Granite City 3.60c.
On cars dock Pacific ports 4.00c.
Wrought iron Pittsburgh 6.10c.

Electrical Sheets

(F.o.b. Pittsburgh)

	Base per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.

Silicon Strip in coils—Sheet price plus silicon sheet extra width extra plus 25c per 100 lb. for coils. Pacific ports add 70c. a 100 lb.

Long Ternes

No. 24 unassorted 8-lb. coating f.o.b. Pittsburgh or Gary 3.95c.
F.o.b. cars dock Pacific ports. 4.65c.

Vitreous Enameling Stock, 20 Gage*

Pittsburgh, Chicago, Gary, Youngstown, Middletown or Cleveland 3.35c.
Detroit, del'd 3.45c.
Granite City 3.45c.
On cars dock Pacific ports 3.95c.

TIN MILL PRODUCTS

*Tin Plate

Per Base Box

Standard cokes, Pittsburgh, Chicago and Gary \$5.00
Standard cokes, Granite City... 5.10

* Prices effective Nov. 10 on shipments through first quarter of 1939.

Special Coated Manufacturing Ternes

Per Base Box

Granite City \$4.40
Pittsburgh or Gary 4.30

Roofing Terne Plate

(F.o.b. Pittsburgh)

(Per Package, 112 sheets, 20 x 28 in.)	
8-lb. coating I.C.	\$12.00
15-lb. coating I.C.	14.00
20-lb. coating I.C.	15.00
25-lb. coating I.C.	16.00
30-lb. coating I.C.	17.25
40-lb. coating I.C.	19.50

Black Plate, 29 gage and lighter
Pittsburgh, Chicago and Gary 3.05c.
Granite City 3.15c.
On cars dock Pacific ports, boxed 4.00c.

HOT ROLLED STRIP

(Widths up to 12 in.)

Base per Lb.

Pittsburgh, Chicago, Gary, Cleveland, Middletown, Youngstown or Birmingham 2.15c.
Detroit, delivered 2.25c.

Cooperage Stock

Pittsburgh & Chicago 2.25c.

COLD ROLLED STRIP*

Base per Lb.

	Base per Lb.
Pittsburgh, Youngstown or Cleveland	2.95c.
Chicago	3.05c.
Detroit, delivered	3.05c.
Worcester	3.15c.

* Carbon 0.25 and less.

Commodity Cold Rolled Strip

	Base per Lb.
Pittsburgh, Youngstown, or Cleveland	3.10c.
Detroit, delivered	3.20c.
Worcester	3.50c.

COLD ROLLED SPRING STEEL

Pittsburgh

and

Cleveland Worcester

Carbon	0.26-0.50%	2.95c.	3.15c.
Carbon	0.51-0.75	4.30c.	4.50c.
Carbon	0.76-1.00	6.15c.	6.35c.
Carbon	1.01-1.25	8.35c.	8.55c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh, Chicago, Cleveland and Birmingham)

To Manufacturing Trade

Per Lb.

Bright wire	2.60c.
Galvanized wire, base	2.65c.*
Spring wire	3.20c.

* On galvanizing wire to manufacturing trade, size and galvanizing extras are charged, the price Nos. 6 to 9 gage, inclusive, thus being 3.15c.

To the Trade

Base per Keg

Standard wire nails	\$2.45
Coated nails	2.45
Cut nails, carloads	3.60

Base per 100 Lb.

Annealed fence wire	\$2.95
Galvanized fence wire	3.35
Polished staples	3.15
Galvanized staples	3.40
Twisted barbless wire	3.30
Woven wire fence, base column	67
Single loop bale ties, base col.	56
Stand. 2 pt., 12.5 gage barbed cattle wire, per 80 rod spool	\$2.62
Stand. 2 pt., 12.5 gage barbed hog wire, per 80 rod spool	\$2.80

Note: Birmingham base same on above items, except spring wire.

Add \$4 a ton for Mobile, Ala.; \$5 for New Orleans; \$6 for Lake Charles to above bases, except on galvanized and annealed merchant fence wire, which are \$1 a ton additional in each case.

STEEL AND WROUGHT IRON PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills
F.o.b. Pittsburgh only on wrought iron pipe.

Steel	Wrought Iron	Butt Weld	Lap Weld
In. Black Galv.	In. Black Galv.		
1/8 .56	36	1/4 & 3/8 .9 +9 +30	
1/8 to 3/8 .59	43 1/2	1/2 .24 6 1/2	
1/2 .63 1/2 54	54	3/4 .30 13	
3/8 .66 1/2 58	58	1 & 1/4 .34 19	
1 to 3 .68 1/2 60 1/2	60 1/2	1 1/2 .38 21 1/2	
		2 .37 21 1/2	
2 .61	52 1/2	2 .30 15	
2 1/2 & 3 .64	55 1/2	2 1/2 to 3 1/2 31 1/2 17 1/2	
3 1/2 to 6 .66	57 1/2	4 .33 21	
7 & 8 .65	55 1/2	4 1/2 to 8 .32 20	
9 & 10 .64 1/2 55	55	9 to 12 .28 15	
11 & 12 .63 1/2 54			
Butt weld, extra strong, plain ends			
1/8 .54 1/2 41 1/2		1/4 & 3/8 .10 +10 +43	
1/2 to 3/8 .56 1/2 45 1/2		1/2 .25 9	
1/2 .61 1/2 37 1/2		3/4 .31 15	
3/4 .65 1/2 57 1/2		1 to 2 .38 22 1/2	
1 to 3 .67 60			
Lap weld, extra strong, plain ends			
2 .59 51 1/2	2 .33 18 1/2		
2 1/2 & 3 .63	55 1/2	2 1/2 to 4 .39 25 1/2	
3 1/2 to 6 .66 1/2 59	59	4 1/2 to 6 .37 24	
7 & 8 .65 1/2 56	56	7 & 8 .38 24 1/2	
9 & 10 .64 1/2 55	55	9 to 12 .32 20 1/2	
11 & 12 .63 1/2 54			

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or \$4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or \$2 a ton higher, on all butt weld 8 in. and smaller.

Boiler Tubes

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes. Minimum Wall. (Net base prices per 100 ft. f.o.b. Pittsburgh in carload lots)

	Seamless		Lap
	Cold Drawn	Hot Rolled	Hot Rolled
1 in. o.d....13 B.W.G.	\$ 9.01	\$ 7.82	---
1 1/4 in. o.d....13 B.W.G.	10.67	9.26	---
1 1/4 in. o.d....13 B.W.G.	11.70	10.23	\$9.72
1 1/4 in. o.d....13 B.W.G.	13.42	11.64	11.06
2 in. o.d....13 B.W.G.	15.03	13.04	12.38
2 1/4 in. o.d....13 B.W.G.	16.78	14.54	13.79
2 1/4 in. o.d....13 B.W.G.	18.45	16.01	15.16
2 1/4 in. o.d....12 B.W.G.	20.21	17.54	16.58
2 1/4 in. o.d....12 B.W.G.	21.42	18.59	17.54
2 1/4 in. o.d....12 B.W.G.	22.48	19.50	18.35
2 1/4 in. o.d....11 B.W.G.	23.37	24.63	23.15
4 in. o.d....10 B.W.G.	35.20	30.54	28.66
4 1/4 in. o.d....10 B.W.G.	43.04	37.35	35.22
5 in. o.d....9 B.W.G.	54.01	46.87	44.25
6 in. o.d....7 B.W.G.	82.93	71.96	68.14

Extras for less carload quantities:

10,000 lb. or ft. over	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	20%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft.	65%

CAST IRON WATER PIPE

Per Net Ton

*6-in. and larger, del'd Chicago \$51.00

6-in. and larger, del'd New York 49.00

*6-in. and larger, Birmingham 43.00

6-in. and larger, f.o.b. dock, San

Francisco or Los Angeles 52.00

F.o.b. dock, Seattle 52.00

4-in. f.o.b. dock, San Francisco

or Los Angeles 55.00

F.o.b. dock, Seattle 52.00

Class "A" and gas pipe, \$3 extra

4-in. pipe is \$3 a ton above 6-in.

Prices for lots of less than 200 tons. For 200 tons and over, 6-in. and larger is \$42, Birmingham, and \$50 delivered Chicago and 4-in. pipe, \$45, Birmingham, and \$54 delivered Chicago.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Per Cent Off List

Machine and carriage bolts:

1/2 in. & 6 in. and smaller 68 1/2

Larger and longer up to 1 in. 66

1/4 in. and larger 64

Lag bolts 66

Plow bolts, Nos. 1, 2, 3

and 7 68 1/2

Hot pressed nuts, and c.p.c.

and t-nuts, square or hex.

blank or tapped:

1/2 in. and smaller 67

9/16 in. to 1 in. inclusive 64

1 1/8 in. and larger 62

On the above items with the exception of plow bolts, there is an additional allowance of 10 per cent for full container quantities.

On all of the above items, there is an additional 5 per cent allowance for carload shipments.

Semi-fin. hexagon nuts U.S.S. S.A.E.

1/2 in. and smaller 67 70

9/16 to 1 in. 64 65

1 1/8 in. and larger 62 62

In full container lots, 10 per cent additional discount.

Stove bolts in packages, nuts attached 72 1/2

Stove bolts in packages, with nuts separate 72 1/2 and 12 1/2

Stove bolts in bulk 84

On stove bolts freight is allowed to destination on 200 lb. and over.

Large Rivets

(1/2 in. and larger)

Base Per 100 Lb.

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham \$3.40

Small Rivets

(7/16 in. and smaller)

Per Cent Off List

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham .65 and 10

Cap and Set Screws

(Freight allowed to destination)

Per Cent Off List

Milled hexagon head, cap screws, 1 in. dia. and smaller 50 and 10

Milled headless set screws, cut thread 1/4 in. and smaller 70

Upset hex. head cap screws U.S.S. or S.A.E. thread 1 in. and smaller 67 1/2

Upset set screws, cup and oval points 75

Milled studs 60

Alloy and Stainless Steel

Alloy Steel Blooms, Billets and Slabs

F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem.

Base price, \$56.00 a gross ton.

Alloy Steel Bars

F.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.

Open-hearth grade, base 2.80c.

Delivered, Detroit 2.90c.

S.A.E. Alloy Series Differential Numbers per 100 Lb.

200 (1 1/2% Nickel) \$0.35

2100 (1 1/2% Nickel) \$0.75

2300 (3 1/2% Nickel) 1.55

2500 (5% Nickel) 2.25

3100 Nickel-chromium 0.70

3200 Nickel-chromium 1.85

3300 Nickel-chromium 3.80

3400 Nickel-chromium 3.20

4100 Chromium-molybdenum (0.15 to 0.25 Molybdenum) 0.55

4100 Chromium-molybdenum (0.25 to 0.40 Molybdenum) 0.75

4600 Nickel - molybdenum (0.20 to 0.30 Mo. 1.50 to 2.00 Ni.) 1.10

5100 Chrome steel (0.60-0.90 Cr.) 0.35

5100 Chrome steel (0.80-1.10 Cr.) 0.45

5100 Chromium spring steel 0.15

6100 Chromium-vanadium bar 1.20

6100 Chromium-vanadium spring steel 0.85

Chromium-nickel vanadium 1.50

Carbon-vanadium 0.85

These prices are for hot-rolled steel bars. The differential for most grades in electric furnace steel is 50c. higher. Slabs with a section area of 16 in. and 2 1/2 in. thick or over take the billet base.

Alloy Cold-Finished Bars

F.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo, 3.40c. base per lb. Delivered Detroit, 3.50c. carlots.

CORROSION & HEAT RESISTANT ALLOYS

(Base prices, cents per lb., f.o.b. Pittsburgh)

Chrome-Nickel

No. 304 No. 302

Forging billets 21.25c. 20.40c.

Bars 25c. 24c.

Plates 29c. 27c.

Structural shapes 25c. 24c.

Sheets 36c. 34c.

Hot-rolled strip 23.50c. 21.50c.

Cold-rolled strip 30c. 28c.

Drawn wire 25c. 24c.

Straight Chrome

No. No. No. No.

410 430 442 446

Bars 18.50c. 19c. 22.50c. 27.50c.

Plates 21.50c. 22c. 25.50c. 30.50c.

Sheets 26.50c. 29c. 32.50c. 36.50c.

Hot Strip 17c. 17.50c. 23c. 28c.

Cold stp. 22c. 22.50c. 28.50c. 36.50c.

TOOL STEEL

High speed 67c.

High-carbon-chrome 43c.

Oil-hardening 24c.

Special 22c.

Extra 18c.

Regular 14c.

Prices for warehouse distribution to all points on or East of Mississippi River are 2c. a lb. higher. West of Mississippi quotations are 3c. a lb. higher.

British and Continental

BRITISH

Per Gross Ton f.o.b. United

RAW MATERIALS PRICES

PIG IRON

No. 2 Foundry

F.o.b. Everett, Mass.	\$22.00
F.o.b. Bethlehem, Birdsboro and Swedeland, Pa., and Sparrows Point, Md.	22.00
Delivered Brooklyn	24.50
Delivered Newark or Jersey City	23.53
Delivered Philadelphia	22.84
F.o.b. Neville Island, Erie, Pa., Toledo, Chicago, Granite City, Cleveland and Youngstown	21.00
F.o.b. Buffalo	21.00
F.o.b. Detroit	21.00
Southern, delivered Cincinnati	21.06
Northern, delivered, Cincinnati	21.44
F.o.b. Duluth	21.50
F.o.b. Provo, Utah	19.00
Delivered, San Francisco, Los Angeles or Seattle	24.50
F.o.b. Birmingham*	17.38

* Delivered prices on southern iron for shipment to northern points are 3c. a ton below delivered prices from nearest northern basing point on iron with phosphorus content of 0.70 per cent and over.

Malleable

Base prices on malleable iron are 50c. a ton above No. 2 foundry quotations at Everett, Eastern Pennsylvania furnaces, Erie and Buffalo. Elsewhere they are the same, except at Birmingham and Provo, which are not malleable iron basing points.

Basic

F.o.b. Everett, Mass.	\$21.50
F.o.b. Bethlehem, Birdsboro and Swedeland and Steelton, Pa., and Sparrows Point, Md.	21.50
F.o.b. Buffalo	20.00
F.o.b. Neville Island, Erie, Pa., Toledo, Chicago, Granite City, Cleveland and Youngstown	20.50
Delivered Philadelphia	22.34
Delivered Canton, Ohio	21.89
Delivered Mansfield, Ohio	22.44
F.o.b. Birmingham	16.00

Bessemer

F.o.b. Buffalo	\$22.00
F.o.b. Everett, Mass.	23.00
F.o.b. Bethlehem, Birdsboro and Swedeland, Pa.	23.00
Delivered Newark or Jersey City	24.53
Erie, Pa., and Duluth	22.00
F.o.b. Neville Island, Toledo, Chicago and Youngstown	21.50
F.o.b. Birmingham	22.00
Delivered Cincinnati	22.11
Delivered Canton, Ohio	22.89
Delivered Mansfield, Ohio	23.44

Low Phosphorus

Basing points: Birdsboro, Pa., Steelton, Pa., and Standish, N. Y. 26.50

Gray Forge

Valley or Pittsburgh furnace... \$20.50

Charcoal

Lake Superior furnace \$25.00
Delivered Chicago 28.34

Canadian Pig Iron

Per Gross Ton

Montreal

Foundry Iron	\$24.50 base
Malleable	25.00 base
Basic	24.50 base

Toronto

Foundry iron	\$22.50 base
Malleable	23.00 base
Basic	22.50 base

On all grades 2.25 per cent silicon and under is base. For each 25 points of silicon over 2.25 per cent an extra of 25c. is charged.

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.

Per Gross Ton

Domestic, 80% (carload) \$80.00

Spiegeleisen

Per Gross Ton Furnace

Domestic, 19 to 21% \$28.00

Domestic, 26 to 28% 33.00

Electric Ferrosilicon

Per Gross Ton Delivered; Lump Size

50% (carload lots, bulk) \$69.50*

50% (ton lots in 50 gal. bbl.) .. 80.50*

75% (carload lots, bulk) 126.00*

75% (ton lots in 50 gal. bbl.) .. 139.00*

Bessemer Ferrosilicon

F.o.b. Furnace, Jackson, Ohio

Per Gross Ton

10.00 to 10.50% \$30.50

For each additional 0.50% silicon up to 12%, 50c. per ton is added. Above 12% add 75c. per ton.

For each unit of manganese over 2%, \$1 per ton additional. Phosphorus 0.75% or over, \$1 per ton additional.

Base prices at Buffalo are \$1.25 a ton higher than at Jackson.

Silvery Iron

Per Gross Ton

F.o.b. Jackson, Ohio, 5.00 to 5.50% \$24.50

For each additional 0.5% silicon up to 12%, 50c. a ton is added. Above 12% add 75c. a ton. The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed. Base prices at Buffalo are \$1.25 a ton higher than at Jackson.

Manganese, each unit over 2%, \$1 a ton additional. Phosphorus 0.75% or over, \$1 a ton additional.

Ferrochrome

Per Lb. Contained Cr., Delivered Carlots, Lump Size, on Contract

4 to 6% carbon 10.50c.*

2% carbon 16.50c.*

1% carbon 17.50c.*

0.10% carbon 19.50c.*

0.06% carbon 20.00c.*

Silico-Manganese

Per Gross Ton, Delivered, Lump Size, Bulk, on Contract

3% carbon \$83.00

2.50% carbon 88.00

2% carbon 93.00

1% carbon 103.00

Other Ferroalloys

Ferrotungsten, per lb. contained W del., carloads..... \$1.75

Ferrotungsten, 100 lbs. and less 2.00

Ferrovanadium, contract, per lb. contained V., delivered \$2.70 to \$2.90†

Ferrocolumbium, per lb. contained columbium, f.o.b. Niagara Falls, N. Y., tons lots \$2.25†

Ferrocobaltititanium, 15 to 18% Ti, 7 to 8% C, f.o.b. furnace carload and contract per net ton \$142.50

Ferrocobaltititanium, 17 to 20% Ti, 3 to 5% C, f.o.b. furnace, carload and contract, per net ton \$157.50

Ferrophosphorus, electric, or blast furnace material, in carloads, f.o.b. Anniston, Ala., for 18%, with \$3 unitage, freight equalized with Rockdale, Tenn., per gross ton \$58.50

Ferrophosphorus, electrolytic, 23-26% in car lots, f.o.b. Monsanto (Siglo), Tenn., 24%, per gross ton, \$3 unitage, freight equalized with Nashville \$75.00

Ferromolybdenum, per lb. Mo. f.o.b. furnace 95c.

Calcium molybdate, per lb. Mo. f.o.b. furnace 80c.

Molybdenum oxide briquettes 48-52% Mo; per lb. contained Mo, f.o.b. Langeth, Pa. 80c.

* Spot prices are \$5 per ton higher.

† Spot prices are 10c. per lb. of contained element higher.

ORES

Lake Superior Ores

Delivered Lower Lake Ports	Per Gross Ton
Old range, Bessemer	51.50% .. \$5.25
Old range, non-Bessemer	51.50% .. 5.10
Messabi, Bessemer	51.50% .. 5.10
Messabi, non-Bessemer	51.50% .. 4.95
High phosphorus	51.50% .. 4.85

Foreign Ore

C.i.f. Philadelphia or Baltimore	Per Unit
Iron, low phos., copper free, 55 to 58% dry, Algeria	12c.
Iron, low phos., Swedish, average, 68½% iron	12c.
Iron, basic or foundry, Swedish, aver. 65% iron	11c.
Iron, basic or foundry, Russian, aver. 65% iron	Nominal
Man. Caucasian, washed 52%	29c.
Man. African, Indian, 44-48%	25c.
Man. African, Indian, 49-51%	28c.
Man. Brazilian, 46 to 48%	27c.

Per Short Ton Unit

Tungsten, Chinese, Wolframite, duty paid, delivered	\$19.25
Tungsten, domestic, scheelite delivered	\$16.00 to \$18.00
Chrome or (lump) c.i.f. Atlantic Seaboard, per gross ton: South African (low grade)	\$15.00
Rhodesian, 45% .. 19.00	
Rhodesian, 48% .. 22.50	
Turkish, 48-49% .. 22.50	
Turkish, 45-46% .. 19.00	
Turkish, 40-44% .. 17.00	
Chrome concentrates (Turkish) c.i.f. Atlantic Seaboard, per gross ton:	
50% .. \$25.00	
48-49% .. 23.50	

FLUORSPAR

Per Net Ton

Domestic washed gravel, 85-5, f.o.b. Kentucky and Illinois mines, all rail	\$17.00 to \$18.00
Domestic, f.o.b. Ohio River landing barges	18.00
No. 2 lump, 85-5, f.o.b. Kentucky and Ill. mines	18.00
Foreign, 85% calcium, fluoride, not over 5% silicon, c.i.f. Atlantic ports, duty paid	21.50
Domestic No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	31.50

FUEL OIL

Per Gal.

No. 2, f.o.b. Bayonne	3.75c.
No. 6, f.o.b. Bayonne	2.25c.
No. 5 Bur. Stds., del'd Chicago	3.25c.
No. 6 Bur. Stds., del'd Chicago	2.75c.
No. 3 distillate, del'd Cleve'd.	5.50c.
No. 4 industrial, del'd Cleve'd.	5.25c.
No. 5 industrial, del'd Cleve'd.	3.00c.
No. 6 industrial, del'd Cleve'd.	2.75c.

COKE

Per Net Ton

Furnace, f.o.b. Connells-ville, Prompt	\$3.75
Furnace, f.o.b. Connells-ville, Prompt	\$4.75 to 5.50
Foundry, by - product, Chicago ovens	10.25
Foundry, by - product, del'd New England	12.50
Foundry, by - product, del'd Newark or Jersey City	10.88 to 11.40
Foundry, by - product, Philadelphia	10.95
Foundry, by - product, delivered Cleveland	10.30
Foundry, by - product, delivered Cincinnati	9.75
Foundry, Birmingham	7.50
Foundry, by - product, del'd St. Louis Industrial district	10.75 to 11.00
Foundry, from Birmingham, f.o.b. cars dock Pacific ports	14.75

IRON AND STEEL WAREHOUSE PRICES

PITTSBURGH*

Base per L.b.

***Plates	3.55c.
***Shapes	3.55c.
***Soft steel bars and small shapes	3.60c.
***Reinforcing steel bars	2.70c.
Cold finished bars and screw stock	3.70c.
**Hot rolled strip	3.75c.
**Hot rolled sheets	3.50c.
Galv. sheets (24 ga.) 500 lb. to 1499 lb.	4.50c.
Wire, black, soft annealed	3.15c.
Wire, galv., soft	3.55c.
Track spikes (1 to 24 kegs)	3.60c.
Wire nails (in 100-lb kegs)	2.65c.

On plates, structural, bars strip and hot rolled sheets, base applied to orders of 400 to 1999 lb.

* On reinforcing bars base applies to orders of less than one ton and includes switching and cutting charge.

* All above prices for delivery within the Pittsburgh switching district.

** For the time being, these prices are purely nominal as concessions ranging from \$3 to \$5 a ton on these products have been made recently on local sales.

NEW YORK

Base per L.b.

Plates, 1/4 in. and heavier	3.76c.
Structural shapes	3.75c.
Soft steel bars, round	3.94c.
Iron bars, Swed. char-coal	7.50 to 8.25c.
Cold-fin, shafting and screw stock:	
Rounds, squares, hexagons	4.14c.
Flats up to 12 in. wide	4.14c.
Cold-rolled strip, soft and quarter hard	3.66c.
Hot-rolled strip, soft O.H.	4.11c.
*Hot-rolled sheets (8-30 ga.)	3.40c.
Galv. sheets (24 ga.)	4.50c.
Long ternes (24 ga.)	5.50 to 6.20c.
Cold-rolled sheets (20 ga.)	
Standard quality	4.60c.
Deep drawing	4.85c.
Stretcher leveled	5.10c.
SAE, 2300, hot-rolled	7.50c.
SAE, 3100, hot-rolled	6.10c.
SAE, 6100, hot-rolled annealed	10.25c.
SAE, 2300, cold-rolled	8.69c.
SAE, 3100, cold-rolled, annealed	7.29c.
Floor plate, 1/4 in. and heavier	5.43c.
Standard tool steel	12.50c.
Wire, black, annealed (No. 9)	4.65c.
Wire, galv. (No. 9)	5.00c.
Open-hearth spring steel	4.75c. to 10.25c.
Common wire nails, per keg in 25 kg lots	\$2.90

*For lots less than 2000 lb.

CHICAGO

Base per L.b.

Plates and structural shapes	3.55c.
Soft steel bars, rounds and angles	3.60c.
Soft steel squares, hexagons, channels and Tees	3.75c.
Hot rolled strip	3.75c.
Floor plates	5.15c.
Hot rolled sheets	3.50c.
Galvanized sheets	4.50c.
Cold rolled sheets	4.45c.
Cold finished carbon bars	3.80c.

Above prices are subject to deductions and extras for quantity and are f.o.b. consumer's plant within Chicago free delivery zone.

CLEVELAND

Base per L.b.

Plates	3.55c.
Structural shapes	3.73c.
Soft steel bars	3.50c.
Reinfor. bars (under 2000 lb.)†	2.55c.
Cold-fin. bars (1000 lb. over)	3.80c.
Hot-rolled strip	3.65c.
Cold rolled sheets	4.70c.
Cold-finished strip	3.35c.
Galvanized sheets (No. 24)	4.62c.
Hot-rolled sheets	3.50c.
Floor plates, 3/16 in. and heavier	5.33c.
*Black ann'l'd wire, per 100 lb.	\$3.10
*No. 9 galv. wire, per 100 lb.	3.50
*Com. wire nails, base per keg	2.60
Hot rolled alloy steel (3100)	6.05c.
Cold rolled alloy steel (3115)	6.85c.

* For 5000 lb. or less.

† 500 lb. base quantity.

Prices shown on hot rolled bars, strip, sheets, shape and plates are for 400 to 1999 lb. Alloy steel, 1000 lb. and over; galvanized sheets, 150 to 1499 lb.; cold rolled sheets, 399 lb. and under.

ST. LOUIS

Base per L.b.

Plates and structural shapes	3.47c.
Bars, soft steel (rounds and flats)	3.72c.
Bars, soft steel (squares, hexagons, ovals, half ovals and half rounds)	3.87c.
Cold fin. rounds, shafting, screw stock	4.07c.
Galv. sheets (24 ga.)	4.53c.
Hot rolled sheets	3.53c.
Galv. corrugated sheets, 24 ga. and heavier*	4.58c.
Structural rivets	5.02c.

* No. 26 and lighter take special prices.

BOSTON

Base per L.b.

Structural shapes, 3 in. and larger	5.85c.
Plates, 1/4 in. and heavier	3.85c.
Bars	3.98c.
Heavy hot rolled sheets	3.86c.
Hot rolled sheets	4.21c.
Hot rolled annealed sheets	4.76c.
Galvanized sheets	4.76c.
Cold rolled sheets	4.93c.

The following quantity differentials apply: Less than 100 lb., plus \$1.50 per 100 lb.; 100 to 399 lb., plus 50c.; 400 to 1999 lb. base; 2000 to 3999 lb. minus 20c.; 10,000 to 39,999 lb. minus 30c.; 40,000 lb. and over minus 40c.

BUFFALO

Base per L.b.

Plates	3.77c.
Floor plates	5.40c.
Struc. shapes	3.55c.
Soft steel bars	3.60c.
Reinforcing bars (20,000 lb. or more)	2.05c.
Cold-fin. flats, squares, rounds, and hex.	3.80
Hot-rolled sheets, 3/16 x 14 in. to 48 in. wide incl. also sizes	
No. 8 to 30 ga.	3.50c.
Galv. sheets (24 ga.)	4.50c.
Bands and hoops	3.97c.

NEW ORLEANS

Base per L.b.

Mild steel bars	4.20c.
Reinforcing bars	3.24c.
Structural shapes	4.10c.
Plates	4.10c.
Hot-rolled sheets, No. 10	4.35c.
Steel bands	4.75c.
Cold-finished steel bars	5.10c.
Structural rivets	4.85c.
Boiler rivets	4.85c.
Common wire nails, base per keg	3.55
Bolts and nuts, per cent off list	60

REFRACTORIES PRICES

Fire Clay Brick

Per 1000 f.o.b. Works

Super-duty brick, at St. Louis	\$60.90
First quality Pennsylvania	
Maryland, Kentucky, Missouri and Illinois	47.50
First quality, New Jersey	52.50
Second quality, Pennsylvania	
Maryland, Kentucky, Missouri and Illinois	42.75
Second quality, New Jersey	49.00
No. 1, Ohio	39.90
Ground fire clay, per ton	7.10

Silica Brick

Per 1000 f.o.b. Works

Pennsylvania	\$47.50
Chicago District	55.10

Birmingham	47.50
Silica cement per net ton (Eastern)	8.55

Chrome Brick

Net per Ton

Standard f.o.b. Baltimore, Plymouth Meeting and Chester	\$47.00
Chemically bonded f.o.b. Baltimore, Plymouth Meeting and Chester, Pa.	47.00
Magnesite Brick	

Net per Ton

Standard f.o.b. Baltimore and Chester	\$67.00
Chemically bonded f.o.b. Baltimore	57.00

Grain Magnesite

Net per Ton

Imported, f.o.b. Baltimore and Chester, Pa. (in sacks)	\$45.00
Domestic, f.o.b. Baltimore and Chester in sacks	40.00

Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.00
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PHILADELPHIA

Base per Lb.

*Plates, 1/4-in. and heavier	3.40c.
*Structural shapes	3.40c.
*Soft steel bars, small shapes, iron bars (except bands)	3.60c.
†Reinforc. steel bars, square and deformed	2.61c.
Cold-finished steel bars	4.11c.
*Steel hoops	4.10c.
*Steel bands, No. 12 and 3/16 in. incl.	3.60c.
*Spring steel	4.75c.
†Hot-rolled anneal. sheets	3.40c.
†Galvanized sheets (No. 24)	4.43c.
*Diam. pat. floor plates, 1/4 in.	5.00c.

These prices are for delivery in Philadelphia's trucking area.

* For quantities between 400 and 1999 lb.

† For 10 bundles or over.

‡ For one to five tons.

BIRMINGHAM

Base per Lb.

Bars and bar shapes	3.50c.
Structural shapes and plates	3.45c.
Hot rolled sheets No. 10 ga.	3.40c.
Galvanized sheets No. 21 ga.	4.75c.
or more	
Strip	3.65c.
Reinforcing bars	3.50c.
Floor plates	5.83c.
Cold finished bars	4.73c.
Machine and carriage bolts	50 & 10 off list
Rivets (structural)	\$4.60 base

On plates, shapes, bars, hot-rolled strip heavy hot-rolled sheets, the base applies on 400 to 3999 lb. All prices are f.o.b. consumer's plant.

PACIFIC COAST

Base per Lb.

	San Francisco	Los Angeles	Seattle
Plates, tanks and U. M.	3.60c.	4.00c.	3.40c.
Shapes, standard	3.60c.	4.00c.	3.40c.
Soft steel bars	3.65c.	4.00c.	3.65c.
Reinforcing bars, f.o.b. cars dock			
Pacific ports	2.275c.	open	2.975c.
Hot-rolled sheets (No. 10)	3.60c.	4.20c.	3.95c.
Galv. sheets (No. 24 and lighter)	5.15c.	4.75c.	4.75c.
Galv. sheets (No. 22 and heavier)	5.40c.	4.75c.	4.75c.
Cold-finished steel			
Rounds	6.55c.	6.60c.	7.10c.
Squares and hexagons	7.80c.	7.85c.	7.10c.
Flats	8.30c.	8.35c.	8.10c.
Common wire nails—base per keg less carload	\$3.20	\$2.85	\$3.00

All items subject to differentials for quantity.

ST. PAUL

Base per Lb.

Mild steel bars, rounds	4.10c.

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PLANT EXPANSION AND EQUIPMENT BUYING

◀ NORTH ATLANTIC ▶

Standard Brands, Inc., 595 Madison Avenue, New York, has asked bids on general contract for industrial waste treatment plant at branch factory at Pekin, Ill., comprising pumping station, sedimentation and digestion tanks, gas control station and other structures. Cost about \$150,000 with equipment. Metcalf & Eddy, Statler Building, Boston, are consulting engineers.

Tidewater Associated Oil Co., 17 Battery Place, New York, has acquired tract at Old Hook Road, East Twenty-second Street and Central Avenue, Bayonne, N. J., for expansion in oil refinery at that place.

Signal Corps Procurement District, Army Base, Fifty-eighth Street and First Avenue, Brooklyn, asks bids until May 2 for resistors, relay coils, contacts, capacitors and other equipment (Circular 224).

Western Electric Co., Inc., 195 Broadway, New York, telephone instruments and equipment, is arranging call for bids early in May on general contract for new four-story factory branch, storage and distributing plant at Atlanta, Ga., with one-story service, repair and garage building for company trucks and cars, and office structure. Cost close to \$500,000 with equipment. W. R. Kattelle, first noted address, is company engineer.

Johns-Manville Corp., 22 East Fortieth Street, New York, building materials, wallboard, etc., is considering one-story addition, about 90,000 sq. ft. of floor space, to branch plant at Richmond, Ind., for storage and distribution. Cost over \$140,000 with equipment.

Superintendent of Lighthouses, St. George, Staten Island, N. Y., asks bids until May 1 for steel welded construction special class buoys, unlighted type, including 10 first class can, 30 third class can, 15 first class nun, 20 second class nun and 30 third class nun, all 2 ft. in diameter, lengths from 8 to 20 ft. (Circular 59426); until May 5, 54 steel buoy bodies, acetylene or electric lighted, from 3½ to 9 ft. diameter, and 10 to 39 ft. long, some with bells or gongs, some with whistles, all with skeleton lantern towers and bottom counterweights; some of welded and some of riveted construction, no lanterns or illuminating apparatus to be included (Circular 59418), five lighthouse service distance finding visual indicators (Circular 59441).

Commanding Officer, Ordnance Department, Watervliet Arsenal, Watervliet, N. Y., asks bids until May 12 for one self-contained jig saw (Circular 203), thread-milling machine (Circular 204).

Fruehauf Trailer Co., 10940 Harper Avenue, Detroit, motor trailers and parts, has leased one-story building at 537-47 West Twenty-sixth Street, New York, on site, 100 x 140 ft., for factory branch and service plant for metropolitan district. Local headquarters of company are at 45-21 Thirty-seventh Street, Long Island City.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until May 2 for three 15-hp. diesel engine units and spare parts (Schedule 6097) for Brooklyn Navy Yard; eight air ejectors for dynamo condensers, with spare parts, etc. (Schedule 6093) for Brooklyn and Philadelphia yards.

Purchasing and Contracting Officer, Quartermaster Corps, Fort Slocum, N. Y., asks bids until May 2 for two magazine feed boilers, water heaters, brass pipe, nipples, unions, valves, etc. (Circular 842-39).

F. & S. Novelty Mfg. Co., Inc., 61 New Jersey Railroad Avenue, Newark, N. J., metal specialties, has leased space in building at 54 Cross Street for plant. Present works will be removed to new location, and increased production carried out.

Commanding Officer, Ordnance Department, Picatinny Arsenal, near Dover, N. J., asks bids until May 1 for gages, including snap,

adjustable snap, flush pin, thread ring, etc. (Circular 725), small brass forgings for graduated time train rings for fuses (Circular 727).

Ugite Sales Corp., 1401 Arch Street, Philadelphia, a subsidiary of United Gas Improvement Co., same address, has begun work on new coal-tar by-products plant at Chester, Pa., adjoining Delaware steam-electric power plant of parent company, for production of coal-tar derivatives. Cost about \$500,000 with equipment.

Commanding Officer, Ordnance Department, Frankford Arsenal, Philadelphia, asks bids until May 2 for one hand-marking machine with pneumatic table (Circular 1018).

Coca-Cola Bottling Co., Inc., Glens Falls, N. Y., has asked bids on general contract for new one and two-story and basement bottling works, 112 x 140 ft., at South Glens Falls. Cost over \$60,000 with equipment. Melvin L. and Harry A. King, Denison Building, Syracuse, N. Y., are architects.

◀ BUFFALO DISTRICT ▶

Marlin-Rockwell Corp., Jamestown, N. Y., manufacturer of ball and roller bearings, etc., will ask bids soon on general contract for one-story addition, 25 x 170 ft. Cost over \$50,000 with equipment. Beck & Tinkham, Bailey Building, are architects.

Snider Packing Corp., 40 Franklin Street, Rochester, N. Y., canner and food packer, plans expansion and improvements in plant at Fulton, N. Y., including equipment. Cost close to \$100,000 with machinery.

◀ NEW ENGLAND ▶

Continental Baking Co., 56 Goffe Street, New Haven, Conn., has let general contract to Kelley-Wood Construction Co., 240 Putnam Street, for one-story addition for expansion in oven division. Cost close to \$40,000 with oven unit, conveyors and auxiliary equipment. Main offices of company are at 630 Fifth Avenue, New York.

Bureau of Yards and Docks, Navy Department, Washington, asks bids until May 10 for four 20-ton and two 50-ton electric bridge cranes, for Portsmouth Navy Yard, N. H. (Specifications 9144).

Boston Public Works Department, City Hall Annex, Boston, has approved plans for one-story and basement municipal service, repair and garage building, 85 x 195 ft., at 282 Highland Avenue, Roxbury, for city-owned trucks and cars. Cost about \$180,000 with equipment. Financing has been arranged through Federal aid. George N. Jacobs, 18 Oliver Street, is architect.

Commanding Officer, Ordnance Department, Springfield Armory, Springfield, Mass., asks bids until May 2 for two small automatic milling machines (Circular 414), one light-type high-speed drilling machine (Circular 417), all motor-driven.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until May 2 for four single-spindle automatic screw machines (Schedule 6101), two electrically-controlled lathes (Schedule 6089) for Newport, R. I., Naval Station, all motor-driven.

◀ WASHINGTON DIST. ▶

Chemical Warfare Service, Edgewood Arsenal, Edgewood, Md., asks bids until May 1 for valves (Circular 365), pipe wrenches, engineers' wrenches, axes, sets of dies and other tools (Circular 376); until May 15, one universal self-contained, motor-driven grinding machine (Circular 361).

Board of Directors, Cheltenham State School for Negro Boys, Cheltenham, Md., plans extensions and improvements in power house at

institution, including equipment. Bond issue of \$85,000 has been authorized for this and mechanical laundry.

General Purchasing Officer, Panama Canal, Washington, asks bids until May 3 for 12 steel revolving bin units, 2400 bin sub dividers, 12 steel shelving units, 20 panels each; also steel foundry nails, copper tacks, steel packing case strapping, passenger coach axles, brass machine screws, hand lanterns and other equipment (Schedule 3448); until May 4, 50 light manhole frames and covers, 50 tender-brake shoes for cast iron wheels (Schedule 3451).

Contracting Officer, Office of Chief of Engineers, Munitions Building, Washington, asks bids until May 2 for four portable gasoline engine-driven air compressors, eight pneumatic rock drills, eight sets of drill steels and detachable bits for use with rock drills (Circular 47), for Natwick, Mass., New York, Philadelphia and Washington.

Town Council, Easton, Md., asks bids until May 8 for two pumping stations, sedimentation and digestion tanks, power equipment and control apparatus, etc., for municipal sewage disposal works. E. G. Kastenhuber, Jr., is town engineer.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until May 2 for two riveting hammers (Schedule 6103) for Alexandria, Va., yard; one high-speed heavy-duty power hack saw (Schedule 6090) for Philadelphia Navy Yard; one milling machine and equipment, all motor-driven (Schedule 6105); until May 5, 70 high-pressure portable air flasks (Schedule 6125) for Washington; until May 2, 182 acetylene gas cylinders and 182 oxygen gas cylinders (Schedule 6100) for Norfolk Navy Yard, Va.; until May 9, steel flasks (Schedule 6120) for Eastern and Western yards.

◀ SOUTH ATLANTIC ▶

Tropical Model Airplane Co., Fourteenth Avenue and Thirty-sixth Street, Miami, Fla., airplanes and parts, has approved plans for one-story shop, 64 x 80 ft. Cost close to \$40,000 with equipment. LeRoy Weitzel is head.

Purchasing and Contracting Officer, District Quartermaster, District I, CCC, 4th C.A., Charleston, S. C., asks bids until May 5 for drill press, vertical-spindle shapers, band saws, bench saws, jigsaw and other tools (Circular 5407-85).

◀ SOUTHWEST ▶

City Ice & Fuel Co., 6611 Euclid Avenue, Cleveland, has closed agreement with City Council, Kansas City, Kan., for erection of one and two-story building, 140 x 360 ft., in Kansas Public Levee, to be occupied under long-term lease, for new cold storage and refrigerating plant, with equipment and facilities for handling railroad cars, large motor trucks, etc. Complete mechanical-handling equipment will be installed. Cost about \$650,000 with machinery. Joseph W. Radotinsky, Commercial National Bank Building, Kansas City, Kan., is architect; Walter F. Schulz, Shrine Building, Memphis, Tenn., is consulting engineer.

Weber Implement & Auto Co., 1829 Locust Street, St. Louis, has let general contract to Woermann Construction Co., 3800 West Pine Boulevard, for one-story and basement service, repair and shop building, 40 x 130 ft., at 4035 Lindell Boulevard. Cost about \$40,000 with equipment.

United States Engineer Office, Court and Custom House, St. Louis, asks bids until May 1 for dredge pumps and parts for two dredges (Circular 161); until May 5 for a two-story industrial building, 160 x 180 ft., L-shaped with each wing about 60 ft. wide, at U. S. Engineer boatyard, foot of Arsenal Street.

Farmers' Cooperative Commission Co., Hutchinson, Kan., H. C. Morton, general manager, plans addition to grain elevator to provide about 700,000 bu. additional capacity. Cost over \$60,000 with screening, conveying, elevating and other equipment.

Cosden Petroleum Corp., Fort Worth, Tex., is considering new refinery in oil field district of Young County, Tex., with steel tank storage division, power house, pumping station

and other structures. A department will be installed for gasoline production. Company also plans extensions and improvements in present oil refinery at Big Spring, Tex., including equipment; entire project to cost over \$400,000.

United States Engineer Office. Federal Building, Galveston, Tex., asks bids until May 1 for two motor-driven centrifugal air blowers (Circular 258).

◀ SOUTH CENTRAL ▶

Seminole Bottling Co., 1212 McCallie Avenue, Chattanooga, Tenn., has let general contract to Newman Construction Co., LaGrange, Ga., for one-story branch bottling works at LaGrange. Cost about \$45,000 with equipment. R. H. Hunt & Co., Chattanooga Bank Building, Chattanooga, are architects.

Quartermaster. Fort Thomas, Ky., asks bids until May 5 for wrought iron pipe, tees, ell, unions, nipples and valves, and 11 steam heating boilers (Circular 906-22).

St. Landry Parish Police Jury, Opelousas, La., plans new cane sugar mill to be operated as a county project, with power house, machine shop, storage and distributing buildings, and other structures. Cost about \$175,000 with equipment. Election has been called on May 9 to vote bonds in that amount. Theodore Perriore, Balter Building, New Orleans, is architect.

United States Engineer Office. Vicksburg, Miss., asks bids until May 1 for cast steel butterfly valve hand wheels (rough), cast steel wicket gates, horse boxes and bushings, cast steel quoins blocks, cast iron split bushings and cutter shaft thrust bearings, cast iron lock nuts and quoins stays, bronze cutter shaft thrust bearings and cast bronze bushings (Circular 211).

Antwerp Naval Stores Co., Helena, Ark., turpentine, rosin and kindred products, plans extensions in storage and distributing department, with installation of tanks and other equipment to increase capacity from 75,000 to 425,000 gal.

◀ WESTERN PA. DIST. ▶

Westinghouse Electric & Mfg. Co., East Pittsburgh, plans one-story addition to branch plant at 2519 Wilkens Avenue, Baltimore, 41 x 215 ft., used for production of radio equipment and parts. Cost over \$65,000 with equipment.

Allis-Chalmers Mfg. Co., Milwaukee, has asked bids on general contract for one-story and basement addition, 150 x 500 ft., to branch plant at Columbus and Preble Avenues, Pittsburgh, given over largely to manufacture of electrical transformers and parts. Cost over \$400,000 with equipment. Carl Meyer is company architect, first noted address.

United Engineering & Foundry Co., First National Bank, Pittsburgh, steel mill equipment, plans one-story additions to plant at Youngstown, to house equipment now at branch works at Wooster, Ohio, a considerable portion of which will be removed to Youngstown. Plants will be consolidated at latter place.

◀ OHIO AND INDIANA ▶

McCauley Aviation Corp., Dayton, Ohio, steel airplane propellers and kindred equipment, plans large one-story addition and improvements in present plant to provide for capacity of about 5000 propellers per annum, or about five times present output. Cost close to \$250,000 with equipment.

State Welfare Department. State Office Building, Columbus, Ohio, will take bids soon for extensions and improvements in power plant at institution at Hawthornden, near Northfield, Ohio, including new boiler unit and accessories, 400-hp. engine-generator unit, stokers and other equipment. Cost about \$100,000. J. P. Schooley, first noted address, is State architect; R. G. Ingleson, 299 South Front Street, Columbus, is engineer.

Contracting Officer, Materiel Division, Air Corps. Wright Field, Dayton, Ohio, asks bids

until May 1 for airplane mooring anchors, forging dies, etc. (Circular 938), bomb release control, interval type (Circular 935), lamp socket caps, plugs caps, etc. (Circular 934); until May 2, 17 gasoline meters (Circular 946), solderless elbows, nipples and nuts (Circular 940); until May 4, aircraft hydraulic brake control valves, hydraulic pressure control valves, and hydraulic four-way valves (Circular 943); until May 5, 128 tensiometer assemblies (Circular 950); until May 8, 1000 bomb shackle assemblies (Circular 949).

Evansville Refining Co., Evansville, Ind., recently organized, has purchased local tract for new oil refinery, with steel tank storage facilities, pumping station and other structures. Cost over \$70,000 with equipment. New company is headed by R. T. Hertzog, Kilgore, Tex., and J. D. Wrather, Overton, Tex.

Indiana Service Corp., East Wayne Street, Fort Wayne, Ind., plans expansion and improvements in Spy Run steam-electric generating station, including equipment. Cost about \$260,000. Work is scheduled to be carried out during summer.

◀ MICHIGAN DISTRICT ▶

Chandler-Evans Corp., 2200 Eighth Street, Detroit, carburetors, fuel pumps and allied equipment for aircraft motors and diesel engines, parts, etc., has arranged for purchase of five-acre tract near Martin airport, Meriden, Conn., for new one-story branch plant. Cost over \$75,000 with equipment.

Jackson Crankshaft Division, Muskegon Motor Specialties Co., Jackson, Mich., has taken over, for expansion, adjoining property formerly used by Jackson Brass Foundry Co. and Robert Automatic Screw Co.

Rosevale Packing Co., 1801 Adelaide Street, Detroit, food products, has asked bids on general contract for new one-story plant at Division and Orleans Streets. Cost over \$40,000 with equipment.

◀ MIDDLE WEST ▶

Pipe-Weld, Inc., Chicago, organized to manufacture pipe and allied products, has leased one-story building at 2618-28 South Sacramento Avenue, about 10,000 sq. ft. of floor space, for new fabricating plant, with part of structure for storage and distribution.

Playskool Institute, Inc., 900 South Clinton Avenue, Chicago, manufacturer of toys, has leased a two-story building, 32 x 62 ft., at Erie and Thirteenth Streets, Sheboygan, Wis., to be erected by city, for plant. Cost over \$40,000 with equipment. W. C. Weeks, Inc., 720 Ontario Avenue, Sheboygan, is architect.

Constructing Quartermaster. Scott Field, Ill., asks bids until May 2 for 25,500 ft. of metallic armored cable (Circular 6626-68).

City Council. Montezuma, Iowa, has been authorized to arrange bond issue of \$136,000 for new municipal electric light and power plant, for which plans will be drawn soon. It is proposed to use diesel engine-generator units and auxiliary equipment.

Construction Service, Veterans' Administration. Washington, asks bids until May 16 for boilers and auxiliary equipment for new power house at institution at Knoxville, Iowa.

Denver Market & Produce Terminal, Inc., Equitable Building, Denver, plans new market and produce terminal on site bounded by Walnut and Wazee, Ninth and Twelfth Streets. Cost close to \$1,000,000 with conveying, loading and other mechanical-handling equipment. Company was organized recently as a joint interest of Colorado & Southern; Denver & Rio Grande Western; Chicago, Rock Island & Pacific; Chicago, Burlington & Quincy; and Atchison, Topeka & Santa Fe Railroads, all with offices in Denver. Robert Rice, vice-president and general manager of Colorado & Southern Railroad Co., is president.

Tri-State Power Cooperative Association. Boscobel, Wis., has secured appropriation of \$1,500,000 through Federal aid for new steam-electric generating plant near Genoa, Wis., for power supply for 11 cooperative electric organizations. A. Y. Taylor & Co., Clayton, Mo., are consulting engineers. Work will be carried out under direction of Wisconsin Develop-

ment Authority, Tenney Building, Madison, Wis.

Northern Engineering Co., 100 Ogden Avenue, Superior, Wis., has plans by Roland C. Buck, Inc., local architect and engineer, for extensive shop addition.

◀ PACIFIC COAST ▶

Richfield Oil Corp., 555 South Flower Street, Los Angeles, has let general contract to Consolidated Steel Corp., 5700 Eastern Avenue, for one-story machine shop, 50 x 126 ft., at plant in Wilmington district. Cost close to \$40,000 with equipment.

Bureau of Reclamation. Denver, asks bids until May 5 for one generator set and one meter-testing and control table with equipment for Boulder power plant, Boulder Canyon project (Specifications 1223-D).

Val-Vita Packing Co., Fullerton, Cal., will take bids soon on general contract for one-story addition to fruit packing plant, 200 x 535 ft., for storage and distribution. Cost over \$50,000 with conveying, loading and other handling equipment. Douglas McLellan, Architects' Building, Los Angeles, is architect.

Douglas Aircraft Co., Santa Monica, Cal., will take bids soon on general contract for one-story addition, 200 x 250 ft., with mezzanine floor, 50 x 250 ft., for expansion in assembling division. Cost over \$200,000 with equipment. Edward C. and Ellis W. Taylor, 803 West Third Street, Los Angeles, are architects.

Bureau of Supplies and Accounts, Navy Department. Washington, asks bids until May 9 for one gasoline engine-driven crane with rotating boom (Schedule 6092) for East San Pedro, Cal., naval station; one 30-kw. motor-generator, controller for motor and spare parts (Schedule 6095), two 50-kw. motor-generators, two controllers for motors and spare parts (Schedule 6098) for Mare Island Navy Yard.

Associated Telephone Co., 1314 Seventh Street, Santa Monica, Cal., has let general contract to Pozzo Construction Co., 2403 Riverside Drive, Los Angeles, for eight one-story shop and equipment buildings in Signal Hill district, to be built in connection with pole yard at that place. Cost about \$90,000 with equipment and mechanical-handling facilities. Maurice Sasso, 124 West Fourth Street, Los Angeles, is engineer.

◀ FOREIGN ▶

State Electricity Commission, Melbourne, Victoria, Australia. asks bids until June 27 for 4000-kw. turbo-generator units, condensers, pumping machinery, evaporating equipment and accessory equipment for Newport "C" power plant (Specifications 38-39/81).

United Engineering & Foundry Co., First National Bank Building, Pittsburgh, steel mill equipment, has organized a subsidiary under name of Shibaura-United, Ltd., Tokyo, Japan, to establish branch plant in that country. Considerable equipment will be removed from branch plant of company at Wooster, Ohio, for installation in new Japan works, to be ready for operation early in fall.

Frigidaire Division, General Motors Sales Corp., Commercial Street, Leaside, Toronto, Ont., electric refrigerators, ranges, etc., has leased 30,000 sq. ft. additional space in building at location noted, for an electric range manufacturing division, including parts production and assembling. Main offices of company are at Dayton, Ohio.

Northern Engineering Works, Detroit. makers of overhead traveling cranes, electric hoists, cupolas and special machinery, has appointed as New York and foreign representative Wonham, Inc., 44 Whitehall Street, New York.

Harnischfeger Corp., Milwaukee. has moved its Detroit district offices to 845-46 Book Building.

THIS WEEK'S MACHINE TOOL ACTIVITIES...

. . . Sales of machine tools move into higher ground, despite uncertainties abroad . . . The Eastern seaboard is the most affected by the European crisis.

Cincinnati Builders Report Slight Bulge in Sales Volume

CINCINNATI—Machinery bookings in the Cincinnati area were just a shade better the past week than during the preceding period, with reports indicating a better rate of domestic demand. In fact, the margin between export and domestic business is narrowing, with a preponderance of foreign business still among heavy tools. Milling machines, grinders and lathes are receiving greater interest from domestic sources, with lathes predominantly domestic, while millers and grinders are about equal between the two types of demand. There is a much better volume of inquiries for heavy tools, however. Current business reveals substantial orders from two automotive sources for lathes with other undisclosed orders well diversified. Inquiries continue to be brisk with the tone sincere.

Increased Activity Seen In Northern Ohio

CLEVELAND—The market has been more active during the past week than earlier this month. Orders for the Timken Technical High School job at Canton have been distributed and broaching equipment for Chevrolet at Toledo has been allocated. Some equipment is still outstanding on the latter project.

One company supplying the aircraft industry is likely to place additional equipment for a large addition to its plant, which is partly equipped already through recent purchases. Acquisition of Pump Engineering Service Corp. here by Borg-Warner Corp. of Chicago and an increase of the capital stock of the aviation pump company may lead to expansion. A new truck body manufacturing concern will locate in Akron, according to a recent announcement.

Mixed Trends Confuse Eastern Machinery Market

NEW YORK—The crisis in Europe has tended to slow up commitments from general industrial sources in the East and has variously affected machine tool sellers. Some still report a fairly well diversified volume, others than it is coming from aircraft and Army and Navy sources only, while still others report not much sales to any source. A miscellaneous amount of repeat orders came from aircraft parts manufacturers last week. On the other hand, the immediate outlook is not bad, considering all the uncertainties engendered by international and national politics, and the month should finish with a fair volume, though

hardly equal to the record-breaking March totals, the best in a year and a half.

Sales in Middle West Continue on Even Level

CHICAGO—Activity is continuing about on a par with the same period last month. International Harvester Co.

is still working on plans for new machinery at most of its plants surrounding Chicago, but little has been done on this program in the past week. Because of the indefinite aspects of the current European situation, buyers are still unable to predict the course of their business for more than a very short time ahead and this condition, of course, is reflected in their buying policies. Small tool demand also is paralleling last month's.

Detroit Tool and Die Program Increases Machinery Activity

DETROIT—More frequent releases of tool and die work for 1940 model cars have increased activity in this field in the last week. Plymouth and Dodge plans to increase the power output of 1940 engines indicate that machine shop facilities may be changed more than was anticipated earlier when it was reported that equipment was being purchased only to eliminate bottlenecks in production.

Machinery Triples Workers' Buying Power in 25 Years

CHICAGO—Price reductions and wage increases have tripled the purchasing power of the American hourly factory wage in the last 25 years, according to the Machinery and Allied Products Institute, which this week published its findings in a booklet entitled "Machinery and the American Standard of Living."

The institute, of which William J. Kelly of Chicago is president, studied the prices of 20 widely used machine-made products in relation to hourly wage rates in 1914 and today. It also cited statistics to show the employment-creating effects of industrial mechanization.

In the period studied, factory wage rates rose from 24.7c. an hour to 71.3c., and prices of the commodities studied declined 12 per cent. Due to the increase in hourly wage rates and the decline in prices, the average American factory worker today can obtain the twenty items studied with 30.7 per cent of the effort required in 1914. The institute stated that the advantages in terms of weekly or yearly wages are less because hours worked declined during the period.

Figures cited from the Automobile Manufacturers Association showed that the average automobile in 1914 cost \$1,115. To purchase it the average factory worker spent the earnings of 4514 hr., or more than a year and a half. The average price of auto-

mobiles in 1938 was \$783, a sum equal to the earnings of 1098 hr. of work.

An average pair of work shoes which required the earnings of 9 hr. of labor in 1914 can be purchased today with the earnings of 3 hr. and 18 min. A year's clothing for a family of four, which cost the earnings of 709 hr. in 1914, can be purchased today with the earnings of only 305 hr. Light bulbs, electric fans, washing machines, sewing machines and other machine-made items show similar declines in price in terms of factory wage rates. In its discussion of the relation of machinery to employment the institute said:

"The highly developed technological society in America has provided more jobs in proportion to population than have been provided outside of agriculture in any society in the world of which we have record."

Tank Research Begins At Mellon Institute

W.M. B. SCAIFE & SONS CO., Pittsburgh, has established an industrial fellowship in Mellon Institute for the purpose of conducting scientific research on problems pertaining to processes of fabricating and to the use of metal tanks, pressure cylinders, and water-softening equipment, its principal products.

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Some Observations on 18-4-1 High Speed Steel

(CONCLUDED FROM PAGE 34)

On a series of tests made some eight years ago on high speed steel containing varying amounts of nickel, it was found that nickel made the steel more susceptible to decarburization during heat treatment as the nickel was increased from 0.05 to 0.80 per cent. (*THE IRON AGE*, Jan. 19 and Feb. 23, 1933.) That there was an increased tendency for fine-edged tools to decarburize as the nickel was increased there appears to be no doubt, but whether nickel was the sole cause for this decarburization there is considerable doubt today in the writer's mind.

When sample blanks of material from each of heats X, Y and Z were given a regular high speed hardening treatment and were then re-annealed and machined so as to remove 0.040 in. from the outer surfaces, and then given a re-hardening treatment, all heats acted normally as regards sweating, and heat Y showed no evidence of decarburization. Samples of heat Y for this test were ground instead of machined as it was difficult to anneal to a machinable hardness, although the mill anneal of the original material had produced an average Brinell hardness of 223.

The reason or reasons why some heats of high speed steel show an abnormal tendency to sweat on heating for hardening are not definitely known. Some have found that a high silicon content induces this tendency, others that aluminum is the direct cause, and still others attribute it to oxygen, either as oxides, peroxides or dissolved oxygen. The latter would appear to be the most logical conclusion from the evidence at hand.

The deoxidizers silicon, aluminum and vanadium appear to play some part in this matter. In the case of heat X several laboratories had considerable difficulty in checking the vanadium content of this heat. One laboratory reported considerable difficulty in getting the sample into solution. It may be possible that some elements such as nickel, silicon, aluminum and vanadium may, individually or in combination, increase the solubility of the steel for oxides or under certain conditions induce the absorption of oxygen to form unstable oxides. As previously observed, a decarburized but scale-free surface may or may not show a tendency to sweat

abnormally. The same steel on which the decarburized surface sweats abnormally may react normally in this respect if the decarburized surface is removed. One might speculate on the possibility of gas absorption by some steels during the mill pack anneal in a case where the pipe or container might be so tightly sealed as to build up a considerable pressure.

The samples of heat Z which were heated to 2000 deg. F. were to simulate the temperature of 2000 deg. to 2100 deg. F. to which high speed steel is usually heated for forging or rolling. The results of this test would suggest that the temperature of the forging operation would have tended to evacuate any gas perhaps even more effectively than did the experimental treatment at 2000 deg. F.

The notable decrease in the sweat-

ing of the samples annealed at 2000 deg. F., as well as the samples from which 0.080 in. of surface was removed on samples from heat Z, might indicate the possibility that this steel because of some abnormality of analysis may have had the capacity to absorb or react with the gases surrounding it during the mill pack anneal. Another bit of circumstantial evidence indicating something unusual with regard to the anneal was the presence of four bars in the shipment of this steel which contained a surface scale the like of which in thickness and amount has rarely been observed on high speed steel.

Ed. Note.—In the second and last section of this article, Mr. Morrison will give detailed attention to other heat characteristics of 18-4-1 high speed steel, such as cold shortness, hardenability, susceptibility to decarburization, etc.

TRADE NOTES

Lincoln Electric Co., Cleveland, has opened a new office at 222 South 21st Avenue, East, Duluth, Minn. I. R. Bartter, formerly of the company's Minneapolis office, will be in charge; a stock of welders, electrodes and supplies will be maintained for serving the Duluth area.

The Trundle Engineering Co., consultant management engineers with headquarters at Cleveland, is opening a Chicago office in the City National Bank Building. It will be in charge of S. A. Peck, vice-president.

Folmar Bjerre, for six years associated with J. N. Fauver Co., Detroit, announces formation of Bjerre Machine & Accessory Co., with headquarters at 920 West Washington Boulevard, Chicago. The Bjerre company will handle specialized industrial fabricating machinery and accessories in both stock and custom built items.

M. E. Canfield Co., manufacturers agent, 420 East Third Street, Los Angeles, will represent the Laminated Shim Co., Inc., Long Island City, N. Y., in the California territory south of the northern boundaries of San Luis Obispo, Kern and San Bernardino counties.

United Aircraft Corp. has announced that as of April 1 the Chance Vought Aircraft Division, East Hartford, Conn., and Sikorsky Aircraft Division, Stratford, Conn., will be merged into one division known as United Aircraft Corp. Vought-Sikorsky Aircraft Division, Stratford, Conn.

Metallizing Engineering Co., Inc., metallizing equipment manufacturers is tripling its space and consolidating its general offices, plant and warehouse at 2107 41st Avenue, Long Island City, N. Y.

General Scrap Iron, Inc., has established its main office at Bourne Avenue, Phillipsdale, R. I., and will continue to operate its yards at Fall River, Mass., and Providence, R. I.

Associated Sales Co., Inc., Detroit, producers of sound slidefilms and visual sales presentations for the automobile and parts manufacturers in the Detroit area, moved April 1 into new quarters at 3123-37 E. Jefferson Ave., according to Genaro A. Flores, president.

FINANCIAL NOTES

Allegheny Ludlum Steel Corp., Pittsburgh, reports net income of \$206,582 for quarter ended March 31, after charges and Federal income taxes.

Harbison Walker Refractories Co., Pittsburgh, estimates net earnings for quarter ended March 31 were \$207,500 after deductions for taxes, depreciation and depletion, equal, after dividend requirements, to 12c. per common share. This compares with \$142,500, or 7c. per share for the corresponding 1938 quarter.

Rustless Iron & Steel Corp. reports for the first three months of 1939 a net profit of \$207,777, compared with a net profit of \$158,463 in the fourth quarter of 1938 and a net loss of \$62,661 in the first quarter of 1938.

Arthur G. McKee & Co., Cleveland, have reported 1938 net profit of \$612,770, largest in the company's history and \$58,000 above the previous peak in 1931. Stockholders were told in the annual report that more than 90 per cent of the 1938 business was obtained in foreign countries.

Midland Steel Products Co., Cleveland, shows a net profit for 1938 of \$1,450,573 compared with \$2,320,811 for 1937. E. J. Kulas, president, pointed out in his letter to stockholders the current assets totaled \$9,436,200, compared with current liabilities of \$1,200,394.

Woodward Iron Co., Woodward, Ala., reports a net income of \$180,121.23 for the first quarter, after provisions for interest on funded debts and normal federal income tax.